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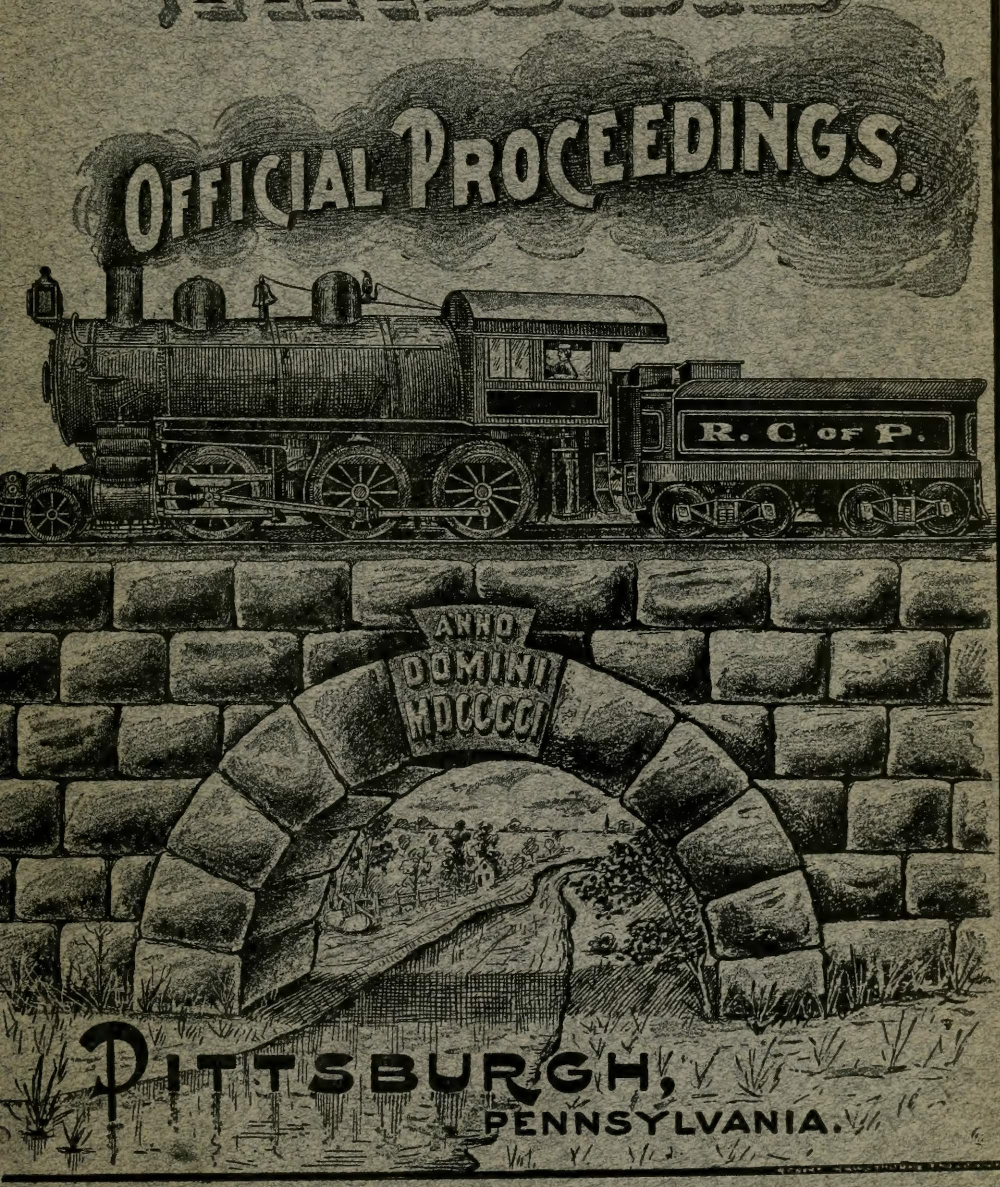

PITTSBURGH,
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Vol. V.

NOVEMBER 1905

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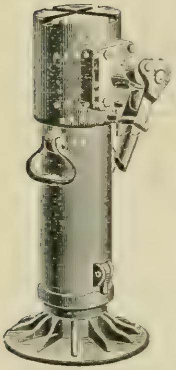

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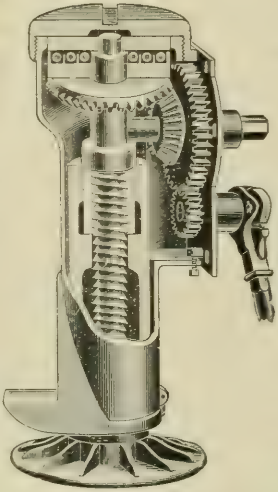

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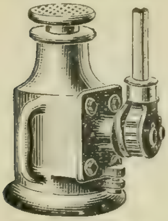

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of the

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ORGANIZED OCTOBER 18, 1901.

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VOL. V.
No. 1.

Pittsburgh, Pa., Nov. 24, 1905.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
NOVEMBER 24th, 1905.

The meeting was called to order at 8 o'clock P. M. at the Monongahela House, Pittsburg, Pa., with President F. H. Stark in the chair.

187016

The following gentlemen registered:

MEMBERS.

Allen, Harvey A.
Blest, M. C.
Branson, C. R.
Brown, Geo. P.
Chittenden, A. D.
Coates, H. T. Jr.
Collier, Paul M.
Conway, J. D.
Coulter, A. F.
Dambach, C. O.
Day, Edward B.
Dyer, J.
Forsberg, R. P.
Grooms, J. C.
Grove, E. M.
Hamilton, Taber.
Hughes, J. E.
Hurd, D. F.
Kessler, D. D.
Lininger, W.
Long, R. M.
Lynn, P. A.
Miller, F. L.
Milligan, John D., M. D.
Moore, A. F.
Morse, C. S.
Murphy, W. J.
McDonnell, F. V.
McFeatters, F. R.
McIlwain, H. M.
McKee, Frank E.
McMullen, F. V.
McNulty, F. M.
Newland, H. F.
Neman, T. E.
Oates, Geo. M.
Ogden, Geo. D.
Peacock, W. H.
Pelletier, Louis.
Piercy, C. B.
Pogue, Robert.
Porter, H. V.
Prall, W. M.
Quest, F. E.
Quest, W. O.
Redding, D. J.
Redus, A. E.
Reed, James.
Reeve, F. J.
Searles, E. J.
Shaler, Fred J.
Shaw, O. M.
Slocum, A. W.
Smith, D. W.
Smith, Ross W.
Stark, F. H.
Strite, F. S.
Stucki, A.
Sweeley, G. P.
Tamkins, B. L.
Tate, Ralph H.
Terry, W. A.
Tesseyman, J. E.
Tucker, John L.
Turner, L. H.
Walsh, C. W.
Warne, J. C.
Warnock, H. R.
Wells, M. E.
Wendt, Edwin F.
Whitney, Louis B.
Wood, W. H.

VISITORS.

Cotton, J. H.
Dolph, D. C.
Donohue, C. H.
Freeman, C. I.
Gardner, K. C.
Green, Coates P.
Jaggard, H. A.
Kessler, Howard.
Kirk, T. S.
Mayhugh, J. R.
Murphy, J. G.
Nicoll, W. R.
Pratt, R. T.
Weisbrod, J. Arthur.
Williams, W. F.
Smith, Sion B.

PRESIDENT: The minutes of the last meeting are in the hands of the printer, and if there are no objections they will stand approved.

SECRETARY: I have received the following applications for membership:

NEW MEMBERS.

Campbell, W. A., Sec. and Treas., Vulcan Crucible Steel Co., Aliquippa, Pa.

Carney, J. J. Foreman Erecting Shop, B. & O. R. R. Glenwood Shops, Pittsburgh, Pa.

Cooper, Geo. A., Sales Agent, Frost Ry. Supply Co., Penobscot Bldg., Detroit, Mich.

Cover, N. C., Clerk to Gen. Foreman, P. & L. E. R. R. Co, Haselton, O.

Curtis, H. C., Clerk, P., C. C. & St. L. R. R., Carnegie, Pa.

Gardner, K. C., Estimate Clerk, Pressed Steel Car Company, McKees Rocks, Pa.

Harris, Wm. J., care Wm. Harris & Sons, Belmont Street, Allegheny, Pa.

Henry, J. S., Gen. Agent, Safety Car Heating and Lighting Company, 160 Broadway, New York, N. Y.

Hinsdale, C. L. Gen. Foreman, P. & L. E. R. R. Co., Haselton, O.

Huchel, John, Inspector, Standard Steel Car Co., Corner Cottage and Michigan Aves., Allegheny, Pa.

Jacob, W. W., Asst. Sales Mgr., Bindley Hdwe. Co., Pittsburgh, Pa.

Jaggard, Herbert A., Gen. Agent, P. R. R. and Penna. Lines, Union Station, Pittsburgh, Pa.

Kennedy, James, Jt. Foreman Car Repairs, M. C. and P. & L. E. R. R., 32d Street, S. S. Pittsburgh, Pa.

Kerchner, Robert, Sales Agent, Chas. A. Schieren & Co., 240 Third Ave., Pittsburgh, Pa.

Koch, Felix, Chief Draughtsman, Pressed Steel Car Co., P. O. Box 290, Allegheny, Pa.

Lace, Thos. C., Foreman Smith Shop, Pittsburgh Coal Co., Coraopolis, Pa.

Lanning, J. F., Rep. E. L. Post & Co., 802 Empire Building, Pittsburgh, Pa.

Lortz, E. A., Gen. Foreman, P. S. C. Co., 3328 Fleming Ave., Allegheny, Pa.

Maher, Thos. K., Gen. Mgr., Belmont Coal Mining Co., 822 Farmers Bank Bldg., Pittsburgh, Pa.

Mitshelen, G. B., Foreman Tender Shop, B. & O. R. R., Glenwood, Pittsburgh, Pa.

McCurdy, D. C., Pres., D. C. McCurdy & Co., Peoples Bank Bldg., Pittsburgh, Pa.

Severance, F. W., Sec. and Treas., S. Severance Mfg. Co., 5923 Kentucky Ave., Pittsburgh, Pa.

Short, L., Gen. Foreman, P. & L. E. R. R., New Castle Jct., Pa.

Slemmer, J. C., F. C. R., Pittsburgh Coal Company, Coraopolis, Pa.

Wagner, George F., Freight Agent. Penna. Lines, East Liberty, Pittsburgh, Pa.

Donohoe, C. H. Gen. Yardmaster, P. & L. E. R. R. Co., Belle Vernon, Pa.

Kirk, T. S., Shipper, Jones & Laughlin Steel Co., 326 Amber St., East Pittsburgh, Pa.

PRESIDENT: As soon as these applications have been favorably passed upon by the Executive Committee the applicants will become members.

SECRETARY: I have received the following communication from the Western Railway Club, of Chicago, Ill.

WESTERN RAILWAY CLUB,

Chicago, Nov. 23, 1905.

Mr. J. D. Conway, Secretary Railway Club, of Pittsburgh.

Dear Sir—I am sending you, under separate cover, a copy of the October Proceedings of the Western Railway Club, and would direct your attention to the discussion on "Increase in Variation in Height of Couplers," beginning on page 55 and continuing to the end.

As you will notice, I was instructed to present the matter to you, and if it meets with your approval, to ask that the subject be taken up for discussion at one of your early meetings; the object being to thoroughly ventilate the question before the various railway clubs and then have it submitted to the Master Car Builders' Association, so that action can be taken towards a modification of the law by the Interstate Commerce Commission.

I trust that you may be able to give the matter early consideration, so that the views of the members of your club may be put in shape to be presented to the Master Car Builders' Association at its convention next June. Yours truly,

JOS. W. TAYLOR, Secretary.

PRESIDENT: If there are no objections this matter will be referred to the Executive Committee.

Gentlemen, we have a very interesting subject that is to be presented this evening, and I trust that every person will feel at liberty to take part in the discussion that will follow. It gives me great pleasure to introduce to you Mr. W. M. Prall, Commissioner of the Pittsburg Car Service Association, who will present the subject for the evening.

MR. W. M. PRALL: I must premise by saying that it affords me a great deal of pleasure to have the opportunity of meeting you. It has been actually my first opportunity, because although I have had the privilege of applying for membership, I did not really have the time to devote to membership.

My subject, gentlemen, is:

IN RELATION TO THE TRANSPORTATION PROBLEM.

BY W. M. PRALL, COMMISSIONER, PITTSBURGH CAR SERVICE ASSOCIATION.

Mr. President and Gentlemen:—

From time immemorial man has been struggling to improve his condition by improving transportation, as without proper transportation facilities goods can only be exchanged at prohibitive cost.

The older nations developed their rivers; they dug canals and they constructed roadways.

The first power was man. He was followed by the ox, the ass, the camel, the horse, the wind and the water.

Man was the original beast of burden, only ceasing to be a beast as he developed capacity to control his surroundings.

He trained the animals and he controlled the wind and water by the windmill and the water wheel, but until he discovered the properties of steam and applied it as engine power, transportation was confined to the banks of the rivers and the shores of the seas, the great uplands with their wealth of mineral and agricultural resources remaining practically undeveloped.

Transportation in the old days was crude, but the methods were direct.

No animal, vehicle or vessel ever awaited the convenience of anyone. When their journeys were completed the cargoes were dumped and the carrier's responsibility was terminated. Carriers by land or carriers by sea were carriers only.

In the early days of railroading the same practice obtained. Cars were not held for convenient unloading, the railroads always reserving the right when cars were unnecessarily detained to unload them either on the ground or in warehouses.

The facilities offered by railroad transportation was followed by an immense increase in the amount of freights transported, necessitating a change in practice, both on the part of the community and the railroads, many consignees in their own interests arranging for the operation of side tracks so that deliveries could be made directly to them at their place of business.

The changed requirements for proper service were not fully understood, neither party appreciating the necessity for a continuation of the old practice of the immediate unloading of the car.

So long as cars were delivered on public delivery tracks the control over the car remained with the railroads, but when cars were delivered on sidings, the control in the unloading passed to the consignee, and where he failed in providing facilities so that cars could be unloaded promptly, it forced the railroads to hold out cars on their tracks, interfering with the movement of succeeding cars, which congested the terminals, increased the expense for service and added to the railroad's obligation.

A railroad must give reasonable service. The law demands it, but after its reasonable service the consignee should relieve the car of its lading within a reasonable time and the law affirms it.

If all railroad service was regular, and if all cars were unloaded immediately after placement, the saving both to the commercial interests and to the railroads would be enormous, while the benefit to the commercial interests would be even greater than the saving.

Both parties agree that service is essential and that reasonable rules and regulations should be administered by the railroads and should be accepted by the consignor and consignee.

The question is: What should be accepted as reasonable? Therefore, the necessity for an analysis as to conditions surrounding the receipt, transportation and delivery of freights.

Every department of a railroad is organized to the end of making possible the free movement of its car equipment.

Improvement in track, elimination of curves, lowering of grades, increased capacity of cars and power of engines are all to one end: car service; that is, quicker and more regular movement of cars to the end of increased tonnage, which is the only way to a possible maintenance of a low rate; consequently every problem before a railroad is to the final solution of the problem of rate making and car service, which are inter-dependent.

The stock in trade of a railroad is the service of its car, and the service of its car must be sold to the public, both to their advantage and the advantage of the railroad.

The prosperity of one cannot be separated from the prosperity of the other.

Increased tonnage movement is only possible where there is additional tonnage output for movement.

There can be no complaint in regard to a rate that has not embodied therein a practical complaint in regard to transportation.

No matter what the resources of a country may be the transportation problem is always vital because without proper transportation facilities markets cannot be made or maintained.

The buyer is always anxious for the early receipt of his freights, and countries prosper in proportion to the time saved on freights transported, because time saved means a reduction in expense in the interest account.

The oblique vision of the ordinary American as to ocean transportation is even more oblique in regard to railroad transportation. He knows the necessity for speed in turning out his product and he feels the necessity for expeditious transportation, but he fails in an understanding of his own acts which lead to delay in the handling of his freights.

The railroad must accept lading when accompanied by proper billing instructions, and by law is obligated to transport it in a reasonable manner, giving reasonable service between initial point and final destination, said service to be in accord with the contract, it being additionally recognized that every allowance made in the freight rate is an allowance made in the obligation of the railroad for service, and that reasonable service cannot be rated the same on commodity freights as it is on freights of the higher classes.

The entire organization of a railroad is to the end of the movement of the individual car, and every expense is in relation to the earning capacity of the car.

An interruption in the process of manufacture in a large industry is immediately recognized in every department of that industry, as sales can only be made of the finished product and the revenue of the industry is entirely dependent upon its output.

The same law applies to the railroad that applies to the industry. The railroad's revenue is entirely dependent upon the completion of the contract, and the completion of the contract includes the release of the vehicle; if the wheels refuse to move the entire process is stopped and the earning capacity is impaired.

It is reasonable to expect that the railroad should have sufficient vehicles with which to transact its ordinary business, but it cannot afford to have the unnecessary vehicle any more than the industry can afford to have the unnecessary machine. Large expenditures for maintenance, for equipment and for power can only be justified by increased tonnage, and it is the strenuous endeavor of the railroads at the present time to solve the problem of future transportation in advance of demands. If equipment, however, is to be used as warehouses on wheels, the new equipment being withdrawn from service, because of delay in its unloading, making it impossible for the railroad to increase its tonnage movement, there would be no justification for the purchase of new equipment.

Conditions were so bad in the year 1888, and so particularly bad at Omaha, that city being so congested that trains were unable to enter the terminals, the lumber dealer having piled up cars in what he thought was his own interest, in advance of his market, that the railroads introduced rules and regulations, allowing a reasonable time for loading and unloading cars, in accord with what their legal departments advised were their obligations and the obligations of the public.

Although the success attendant upon the introduction of the rules was not all that was desired, still there was an improved service, and the organization at Omaha was followed by various organizations which at the present time have been practically extended to all railroad stations in the United States and Canada.

Car service associations having solved some of the necessary service problems, the railroads then further realized the necessity for a change in their regulations for interchange of cars, and in 1902 substituted what is called the "Per Diem Agreement" for their mileage agreement, the per diem agreement automatically making a charge per car for each and every day that the car is on the rails of the connection, whether the car is moving or standing.

Per diem is the recognition of a commercial obligation to pay a rental charge for a neighbor's property, whether the property is in use or not, so long as it has been accepted and is held for the borrower's purpose.

Per diem is the beginning of a better understanding of the mutual obligations as between railroads. I say it is the beginning, because there is not a full recognition of the actual earning value of a car to its owner, yet it is a step in the right direction and makes plain the obligation of the transportation officials to their own companies.

Under the present agreements the railroads have two organizations: Per diem, holding the railroads responsible for the continued movement of the car, and car service associations, which hold the public responsible for the release of the car, it being necessary that the two organizations should work together harmoniously to the end of car movement.

The per diem organization holds the railroads under any and all conditions to the payment of an agreed rental charge.

The car service regulations only hold the public responsible for the release of the car after the railroad has fulfilled its entire contract obligation for the movement of the car, there being no authority to apply a car service rule or regulation as towards a consignee or consignor unless the railroad has first fulfilled as parties of the first part every obligation under the direct contract for service on the individual car; therefore, no consignee need know that there is a car service rule applying to him if he fulfills the contract by removing the lading from the car after it has been reasonably delivered and held during the period of insurance.

In giving consideration to the contract, it is necessary to remember the carrier obligation, the tariff upon which the contract is based, the service which places the car and the time required for its unloading which is the physical time necessary to remove the lading.

There can be no question of reciprocity, because the railroad is simply selling its stock in trade, which is car service, and the obligation is simply to transport the lading in the car in proper service; therefore, it cannot be forced to sell that which is not in its possession, or make a contract for impossible service.

The railroad must be reasonable in all its service, in the placement of cars for loading, in the handling of cars at loading point and it must within a reasonable time transport the car after loading, and if it fails in its transportation, in accord with its direct contract, and the failure is to the detriment of the interests of the shipper or receiver, there is redress in the Courts.

Under no circumstances can the service on one car excuse the railroad for poor service on another car, or can the poor service on one car excuse the consignee from the direct responsibility of unloading other cars that may be delivered after reasonable service.

No railroad official would knowingly promulgate a rule or a regulation that would delay car movement; to the contrary, every effort is to the end of an average increase in the number of miles per day of loaded car movement, it being fully recognized that increased tonnage movement is dependent upon expeditious car movement.

If a given number of cars can handle a given number of tons of freight during a period of one month, and the adoption of any rule would regulate service and increase the tonnage by 10 per cent or 15 per cent, it is a practical addition to the railroad's equipment of that per cent, and the results in freight transportation would be exactly the same as the results in passenger transportation, or in the handling of the transit company's cars in urban service, it being an easy matter to mathematically demonstrate the benefit to all in interest when the Railroad improves service; consequently, all railroad employes are heartily in accord with the desire of the public that car performance should be improved.

The demand that cars should move a certain number of miles per day has arisen from a misunderstanding of the actual conditions. The public does have the right to require from the railroads proper equipment and reasonable service, provided that they come into Court with clean hands and show that the disability is entirely with the railroads, and that delay has not been primarily caused by their slow loading and unloading or delay in furnishing disposition or reconsigning orders.

The expense account for fixed charges in the large cities of the United States is becoming so great that something must be done to relieve the situation, and there must be a full understanding by both parties in interest that the storage of freights at terminals must be along the line of the least resistance, as storage is paid for by the community, whether the storage is in cars, or properly built warehouses or bins; therefore, the question is as to an understanding of just how the necessary stock shall be stored.

When stored in railroad equipment, everything pertaining to the expense of operation must be considered, the expense of the main line, the expense of the sheds, the roadways, the rails or necessary leads and hold tracks, the expense of switching the car to the consignee, and the expense of handling the loaded car or the empty car from the consignee. The law never contemplates that a public carrier should operate at a loss, and the carrier always has its defense when it makes an exhibit, as against impracticable demands, and its interests must always be provided for in the rate; consequently, whenever the community adds to the actual expense of transportation, the expense is exhibited in the rate, and where a community is in competition with other communities it is to the advantage of that community to realize its possible benefit in reducing the expense of transportation by relieving the railroad of the further care and warehousing of its tonnage after it is entitled to its cars' release.

The car service charge **in no way adds to the freight rate. The car service charge is never a part of the freight rate, there is no car service charge on 95 per cent of all the tonnage handled,** and there should be and would be no car service charge if cars were not delayed beyond the period of insurance; consequently, the car service charge is never made by the railroad until **after** it has been forced into involuntary warehousing, and every railroad in the United States would like to get rid of the warehousing obligation.

The carriage of goods between two points within a minimum time invariably results in the decrease of the interest charges in the bank accounts of the business community, as nothing serves them better than dispatch in the handling of their freights to the end of the completion of their contracts and their settlements with their correspondents.

The benefits to them are actual, and so with the benefits to the railroads as expeditious handling of freights either result in the handling of tonnage with a decreased equipment both of cars and engines, or in the increase of tons per mile per car.

If every community was independent of all other communities, possibly there could be a continuation of improper service without the community being vitally affected, although that is problematical, but where every community is in direct competition with every other community and an aggregation of communities make a nation, which is in direct competition with all other nations, it is essential that every possible understanding and agreement may be arrived at that will eventuate in improved car movement at decreased expense.

The transportation problem, therefore, must be solved in its relationship to the interests of the business community, the community recognizing that its obligation and the railroad's obligation is inter-dependent.

It should also be recognized that the inter-dependence is not only as between individual consignees and the railroad, but it is between the individual consignee and all other consignees which the railroad serves, and any act of omission or commission of either the railroad or the community that decreases car movement adds to the expense of operation.

The Rules must be legal, they must be equitable, and they must be expedient, because expediency is necessary in order to attain to harmonious relationship with the public.

They must provide for a reasonable time for the loading and for the unloading of the car.

They must provide a reasonable time for the reconsignment of the car and for the reordering of the car when the contract, which is based upon the tariffs, allows the consignee to distribute his freight at the original rate after arrival at the terminal as designated by the consignor.

The practice under the Rules must provide for irregular service on the part of the railroad, and for acknowledged conditions under which both the railroads and the public operate.

Provision, therefore, must be made for proper record at the stations to the end of the supervision of the agent and the yardmaster over service and for information to the consignor or consignee necessary for his observance of the contract.

A common ground must be developed so that everybody may have an understanding of their responsibility for the handling of the individual car, because cars cannot be considered in the aggregate excepting as an aggregation of individual cars, the movement of the aggregation of cars being entirely dependent upon the movement of the individual car ; therefore, the necessity for sequence in movement by preparation on the part of the consignee to accept and unload the cars as tendered so that the railroad can continue on the succeeding car regular service to the consignee.

It must be additionally remembered, however, that "individual convenience is subservient to the public good," and the Rules must be made to the end of the greatest good to the greatest number.

When they attain to car movement they are in the service of the public and the public should not withhold their hearty co-operation, because they insure to everybody first, last and all the time equal consideration and mutual benefits, so concisely expressed by our strenuous President as a "Square Deal."

PRESIDENT: Gentlemen, I know you all appreciate the very able manner in which this subject has been presented. Mr. Prall is a representative of the railroads, and yet he has made a very frank and open statement, setting forth the responsibilities of the railroads. We have here to-night representatives, both of the shippers and the railroads, and I trust you will all feel at liberty to take part.

I will ask Mr. Terry, General Freight Agent of the P. & L. E. R. R., to open the discussion.

MR. W. A. TERRY: Mr. President and gentlemen: I did not know that there was awaiting me to-night the honor of opening a debate which might be antagonistic at least to the speaker of the evening in what he has said. I have been educated too long in the operating departments of railroads to be other than in sympathy with what has been said.

Car service associations to be successful must be partnership concerns as between the railroad and the industries.

Perhaps we might call it a tripartite service or agreement or association—the car service association, the railroads and the industries. In the old days—I am talking now for Pittsburg—we had car service, but not quite the car service we have to-day. Any institution or organization when it starts out may hamper its entire success for the future by the manner in which it is handled at the outset. Car service in Pittsburg I think received a black eye. For a great many years we were not quite in harmony, the car service association, the railroads and the industries. If a consignee found himself unable to unload his cars promptly he paid too little attention to the consequences of his action, depending almost entirely upon the competitive conditions in railway traffic, to enlist the support of at least the traffic departments in an effort to release his obligations to car service, and as a consequence of that, if a consignee found himself with $500 or $600 of car service against him, he would go to the traffic officer of a railroad and explain how it happened, and the traffic or other representative of the railroad would at once say, "All right, we will fix that up all right. We will instruct Mr. So-and-So to have that cancelled." The consequence of that was that the car service manager, instead of being a manager, was discredited and put in contempt by the association itself. It ceased to be a working organization from a car service standpoint.

Two or three years ago a new era dawned for Pittsburg in car service matters.

In handling car service, the car service manager is the whole show, and the traffic man has nothing to do with it. That does not mean to say that if the traffic man has a reason or argument to present that the manager does not listen to that argument, and if the suggestion is a good one incorporate it in his plan—but I don't know of very many instances where a traffic man has been able to make very much impression upon the car service manager. But I want to give you a little illustration: A receiver of lumber not very long ago found himself in debt to the car service association to the extent of some $800. Having a friend in the traffic department of our little road he advised the car service manager that he would not pay it, he would just see the general freight agent of the little railroad and have that fixed. The gentleman came to my office and stated his case. I told him I did not believe he was at the right place, that if the manager of the car service association having inflicted a penalty for misuse of cars, if there was anything in it to modify the rule, it was the car service manager who must do that; that so far as we were concerned we could not take action that would have the effect of discrediting the association; that car service was a department of the railroads organized for the purpose of helping the other two partners in this tripartite arrangement—help the railroads to a quicker use of their car, help the shipper to a quicker opportunity to load and unload. The man after some little discussion realized the injustice of any action on our part in the way of special request—supposing such request would be granted—that it would be unfair to the car service manager, and the thing for him to do was to see the car service manager himself. He did so, with the result that in a very short time he left that office entirely satisfied with the manner in which his affairs had been handled.

Now there are perhaps some points that might be touched upon, and I will take just one. When a consignee expects his freight to come in at a certain time, when he is told it will be placed at a certain yard on a certain morning by 9 o'clock, and he hires his teams and has them there, and the car is not placed, he feels that it is not a question of car service due the railroad now at all; it is a question of something that is coming to him. Frankly I don't know but the railroads do owe him something under such conditions as those, in the way of more prompt movement of freight. It is barely possible that there is some chance for improvement on their part.

One railroad, a very progressive one, I think, has adopted a plan for the movement of its coarser freight—of course its fast freight is moving on a rather fast schedule—of fixing an average traveling time of six miles an hour. That is small, but when you come to think that the average movement of a car, empty and loaded, per day will probably be less than twenty miles, that six miles an hour for coarse freight is a pretty fair schedule. It would mean I think about three days to Chicago, which is considered fair average time for coarse freight. If the railroads would develop that plan I believe it would come very near to the solution of some of our car shortage difficulties, and possibly place before the consignee a better argument in answer to their question, "If you are entitled to pay for our delay, don't you think there is something coming to us for your delay?"

The paper has been most excellently handled. I don't think I can offer anything further. I am too much in sympathy with that side of it. I would rather you would call on somebody who has an interest on the other side of it.

PRESIDENT: It would be interesting at this time to hear from a representative of the shippers, and I will call on Mr. T. S. Kirk, of Jones & Laughlin.

MR. T. S. KIRK: Mr. President and Gentlemen: I have listened to the very able paper read by our friend Mr. Pratt, and I wish to compliment him on the intelligent effort he has expended on this question of Transportation. Being associated with the manufacturing interests, and being alone as a representative of this interest, I feel something like the New Castle dog, as related by J. W. Gates: this dog was so accustomed to having missiles shied at him that habitually he ran sideways—I expect to be similarly pelted before I escape your hands.

By placing wholly on the manufacturer the responsibility of car detention, I think Mr. Prall has been unjust. We appreciate the difficulties contingent on the misuse or detention of cars, and from this cause the manufacturer as well as the railroad are made to suffer.

A small concern unloading one car per day, which is sufficient perhaps to keep it in operation for a week, is given the same consideration as that extended to another concern consuming 150 cars per day: for one week the large concern must for its operation unload seven times this number (1,050 cars) in the same time that the smaller one would unload seven cars and at the end of the week would have no surplusage, whereas the small concern has stored 49 days' stock. What I wish to convey is that the large consumer should be given fair treatment by a less charge per diem than the charge to the smaller one. In fact, to be fair, the proportion should be as 150 is to 1.

One car may be forwarded promptly or if detained for one week on some outlying siding, no particular damage accrues to the small consumer—he has after all but one car; on the other hand, when 150 cars are detained for one day, which, added to the 150 cars coming in, makes an accumulation of 300 cars to be cared for in the time when only 150 cars should be considered. We have, for instance, cars lying in the Conway yards —a burial ground—these cars remain not 24 hours, but as much as ten days, locked in this cemetery; such detention adds largely to our dilemma. From this citation, you must infer we have a right to believe the railroads are somewhat recreant in the manner in which they handle cars for the convenience of the consumer.

We have to-day in our place 20,000 tons of finished material that should be at destination for fabrication; at 40 tons per car, it would require 500 cars. If we say each car is 40 feet long, we have in this tonnage something like three miles of dead freight lying in our yard, all for lack of cars for its transportation. We load a car for New York, which should consume at the outside not more than 48 hours to Jersey City; what time does it actually require to make this delivery? From 9 to 10 days. Multiply the number of cars by the waste of time over the legitimate, and we find it requires about three times as many cars as would be essential if proper movement were given. From this you can readily see where one source of car shortage may be placed.

It is not cars held in storage, but those held by insufficient movement that is responsible for the universal car shortage.

What we need is a better comprehension of the means by which we may attain the end for better transportation. It is not to invoke the law; that is rather a tardy way out of the difficulty.

I have a suggestion which I wish to present. It is to eliminate the control of the freight rolling stock from the railroads and place it in the hands of a syndicate or clearing house, and by so doing, make a car a universal carrier of freight in any direction, over any railroad. By this means cars would travel under load and become a source of revenue instead of loss, as is now the case, when no home load is available.

I have given this subject some consideration, but cannot here consume the time to explain.

Something in this direction seems to be demanded, and when the people become dissatisfied they are liable to take drastic measures. It may be, unless proper relief is obtained, the people may not only insist on taking charge of rate making, but also in railroad management. This contingency may be remote or very close at hand.

MR. W. M. PRALL: I would like to say to our friend that he has somewhat of a misunderstanding with regard to the rules of car service. Although he is very greatly interested in one of the largest plants, he does not yet know that there is an adjustment for just such conditions as stated by him, in that there is not a factory or furnace or shop in this territory that is not rated in accordance with its consumption per day. There is no idea in the present rules of holding a man to the unreasonable handling of his freights. We say your factory, under proper conditions and circumstances, will use so many cars of each different commodity. We give you two days free time if it is the straight rule, and if you do your own switching we give you switching time for the movement of the load and the return of the empty. We say that two days is double the period of insurance, and the period of insurance is the legal time. There is only one day legal time. We say we will give you the day of the placing of the car in addition to that and will only calculate from the first 7 a. m. after the car is placed. We make these adjustments purposely. Then we say that in handling coarse, heavy product you cannot store or warehouse as you can if you are merchandising, and remembering that, we give you two days instead of one, and you ought to unload every day to your capacity, we ought to charge you every day, with two days' supply.

That was my practice in St. Louis, but when I came here I found that your tonnage was so much larger and the difficulty consequently so much greater, both to the consignee and to the railroads in service, that we only charge you with one and a half days. For instance, if a railroad would bunch on you a thousand cars and your consumption was one hundred cars per day, we would charge you with 150 the first day, 150 the second day, 150 the third day and so on until we had used up the entire 1,000 cars.

Now, in regard to your proposition for a car trust: I will take pleasure in sending you a paper that I wrote in May of 1901, on that subject, which I thought was a practical idea for beginning a car trust. In a few words, I will state that it is an impossibility to have a clearing house. We don't make the kind of men that can clear cars for the whole United States. We are pretty brainy, but to have a man that could distribute cars for all the railroads in the United States we would have to take about a hundred of the brainiest men and condense all the brain power of all those men into one man, and then I don't believe he could do it. There are so many elements to be considered and so many different concerns that must get their proper proportion of cars—for it is not fair in these days of railroading to do anything else than strict equity as nearly as we can understand it in car distribution.

I think a car trust might be formed with authority for each railroad to subscribe for cars instead of stock, just as many or just as few as it wants. They should be all standard cars and should be given serial numbers. The transportation officer of each railroad would handle his own cars, provided he did not have more than his railroad had subscribed for. Then the clearing house would only handle the surplus cars, and it would do away with an immense amount of passing and repassing of empty cars going in opposite directions for home, because they happen to be stenciled with another railroad's name.

It could be introduced without changing any of the present conditions, and with the present cars. It could be introduced generally by the railroads agreeing among themselves as to the number of cars acceping the principle, marking the series and handling the cars of any series, it being further understood that all the cars must be in accord with the M. C. B. requirements.

MR. T. S. KIRK: I think Mr. Prall understands the situation, only I think he does not go far enough along the line in his explanation. The empty car should be a source of revenue to the railroad independently of any stock they might hold in the rolling stock company. They should be paid for hauling the empty car as well as to participate in the profits from freight carried. Mr. Prall asserts that no one can be found whose genius could control a car syndicate. I wish to say I think there are a great many men who are able to do this. I am led to this conclusion from little things that have dropped from railroad sources, along the line of rate legislation. One cannot but infer from the wisdom displayed that within railroad circles alone, where such monumental intelligence may be secured, no difficulty in securing the proper man need confront us.

I still think to eliminate the control of the car from the railroad is a step in the right direction.

The small railroad that cannot afford to enter the combination had better go into liquidation; at most it is only a barnacle fastened to the ship, a speculative effort on the part of the unprincipled. They are built to sell, not to do business along legitimate lines. They pirate on the trunk line for their equipment, and as it comes into their possession, they employ it at the per diem rate until they are disabled or worn out; then, like an old shoe, they discard it.

It is my opinion that this per diem arrangement is to put a price on dishonesty. Why not charge $25.00 per day, after giving a reasonable time for unloading? This would prevent the employment of cars for storage purposes, if for no other reason than the cost; it would induce the parties to provide other means at less cost.

PRESIDENT: It might be interesting at this time if Mr. Hurd, representing one of the trunk lines, explained to us why the railroads do not furnish the equipment to carry Mr. Kirk's product.

MR. KIRK: I would like to hear that.

MR. D. F. HURD: I must decline to answer. Mr. Kirk might want us to deliver the goods, and when our bluff is called we would not have anything in our hand. We have been trying to find out why it is they want so many cars—but we don't dare go very close to them to inquire. I think Mr. Kirk and ourselves can settle this question outside probably better than we can here. I feared that possibly a little later on I might be ordered by the court to appear, but I am not ready for action or for any remarks. I can see the delicacy of the position of a man in the traffic department getting in between these two belligerents. In a predicament of this kind I feel a little bit like a story that was told me. You have not had any yet, and I hope this will not do you any harm. There was a negro church that was in rather bad repair, and the preacher at the morning service said he would like to take up a collection that morning for a few patches on the roof and a railing around the pulpit and a few minor repairs that should be attended to. He said, as the collection plate was passed among them, that those who had money in their pocket could contribute the coin, and those who did not could write their names and the amounts on a piece of paper and drop it in the basket, and the collector would call at their homes to obtain the donations later. As the collectors started around matters remained quiet until one of the dusky pillars of the church arose and said: "Parson, Sister Smith here wants to do something but she ain't got no paper." I am a good deal like Sister Smith, except that I don't want to do anything.

I think that there is one feature that has been demonstrated in the Pittsburg district very clearly—and I have been here but a very short time and have very little knowledge of the range of the question. (I will prove that in a couple of minutes.) That is, that while the car service bureau has been under the management of Mr. Prall a great many good things have been accomplished. When I came here I dropped in on a man to get a little business. He would talk car service to me, and I would make some excuse about having an engagement and I was off until the next time, when maybe he would not think of it. I think Mr. Prall has adopted a plan of education showing that he does not wish to exact anything unreasonable; that his intention is to bring about equity. And there is no argument advanced, I think, in defense of the misuse of cars, as it used to be years ago, when, for instance, the grain people would make a shipment of grain and hold it along the road, using railroad facilities as market conveniences. I think the shippers have their rights here as they have everywhere. Take Mr. Kirk's case for the general situation of the shortage of cars. There are a number of minor concerns in the business district, where real estate is high, who endeavor to use track space for storage. That is very much practiced here. I think you will find that the produce yards of the P. R. R. and the B. & O. are crowded most of the time. The small receiver who has this freight is not ready to unload. He prefers to pay $1.00 a day, but he would not pay $25.00, as has been jokingly suggested. He lets the matter adjust itself because he is saving money, but he is taking up facilities that cost money, particularly in Pittsburg, without paying proper tithe, and deprives others of the use of the facilities.

There is one matter that came to me recently showing how car service rules do not protect. There was an occasion for a large shipment of stone to come here for a building in the East End. I don't know how we happened to get it, and we wished we hadn't. In looking into the matter we found from the receiver here that his order had not been observed. The car had been shipped on here two weeks prior to his request. He could not use it on the property or store it near the property because there was no place to unload it. The car lay here and accumulated something like $20.00 car service. Mr. Prall handled that case. I don't know how it came out, except that I met the gentleman in the street the other day and I said: "How did you come out with Prall?" "Prall is all right; he fixed that up fine." I don't know what he did, but the man was satisfied. And I don't believe Mr. Prall gave him 100 per cent either.

As to the car question, I think it will be somewhat improved in the "good old summer time," and not much before that.

PRESIDENT: We have with us Mr. Wells, a representative of the Wabash. Perhaps he could tell us how difficult he finds it to reduce the cost of maintenance in order to make up for the losses on account of the abuse of cars.

MR. M. E. WELLS: There is one point made by Mr. Kirk that impressed me quite a little to-night. He speaks of it taking nine days to get a car from here to Philadelphia or New York. I think that this gentleman has made a valuable suggestion in regard to getting cars over the road. Shippers know just as well as railroads do that cars do not move very rapidly at times. I do believe that it is the duty of the railroads to get the cars over the road with some degree of despatch, and then they will have an argument to put up to the people that load and unload, and would at the same time have more cars to do business with. Follow the cars and give the history of some of them. That is not a very difficult thing to do. Then if the trouble is with the shipper, show him. He will do better next time.

Of course where things are congested it is very hard to get cars over the road. I am especially interested in the motive power end of it, and there is nothing so hard on motive power as being forever and a day getting over the road and lying on side tracks. If what Mr. Kirk says is true, and nobody doubts it, there is something for the railroads to do. I have just come here from the west, and a little before I left the west I saw some of what they call "train chasing." What is the matter that a certain train does not get over the road? The best remedy I know, and I have seen it tried out in practical experience, is to put a road foreman on the engine and a train master on the caboose. Find the trouble and remedy it. You can't do it from an office. I will tell you you can't find out what is going on from an office; you have got to get right out where the business is, and lots of times you will find out a lot of things that you did not know before.

As I say, the reason I am interested in this thing is not so much because of the transportation question as of the motive power question. I am especially interested in boilers, and boilers cannot lie around on side tracks and continue to do good work. But I think this gentleman has made a good point, and he has put it up in just the right way.

I would like to hear some suggestion as to what will immediately help this thing, if there is an immediate help for it.

PRESIDENT: This is very interesting, gentlemen. I wonder if Mr. Turner would not tell us how they get their trains over the road.

MR. L. H. TURNER: Mr. President, we have no such trouble. I believe, however, that every member here has fully enjoyed the forcible, entertaining and instructive manner in which Mr. Prall has presented his paper, and when he got through I thought there was only one side to the story. But after hearing friend Kirk talk, I thought there might be something on the other side. But his paper ought to do a lot of good if it reaches the proper hands. While I am not a traffic man, I want to take this opportunity of offering a resolution that a vote of thanks be tendered Mr. Prall and the gentlemen who participated in the discussion.

PRESIDENT: Before this motion is put, it is possible that Mr. Prall might have a few remarks to make in closing the discussion.

MR. PRALL: There is always a practical side to the presentation of every subject, and I want to say that every practice that has been introduced by me has been to find the practical side from the standpoint of service. I found a great many years ago when I first began railroading that it is pretty difficult for the ordinary superintendent on a railroad to know what he is expected to do. I found that although cars did get over the road, even when they were not chased, in some time, still they got over. Your train was handled by a conductor and crew. Some of the cars originated at a terminal and others were picked up by the local train along the road. But in no case did the car move along the road without there was information along with it. But when a train got into a terminal it dissolved into the individual car, and it was just like a flock of birds. Every individual car then being handled through the head of the yardmaster, there being no record except of its arrival. I remember when I was appointed general agent of the Missouri Pacific at Carondolet. I found a yard that you could not put another car in with a dydraulic ram. The first thing I had to do was to turn out all the clerks in the office to check up eight or nine hundred cars that were actually lost. I stood the condition for about ten days, and then came to the conclusion that there was no reason why I should not have a record of cars in my office that would show not only the receipt of the cars, but whether those cars went to place in accordance with billing instructions. That instead of a check to find out if they were in the yard it should be a check to find out if the cars went to the consignee in accord with instructions on the way bill, and there was a revolution in about thirty days.

It is just as important that the railroads themselves should move cars out of the yard as it is that they should move them into the yard; and it is just as important that the railroads should handle cars in the distributing yards properly as it is to handle cars in the terminal yards properly. In the distributing yard they have the control, but in the terminal yards, where the service is to the consignee, if you cannot get the co-operation of the consignee you cannot give them service. I have proved over and over again where consignees have made complaints and carried those complaints to the higher officials, that when they co-operated with me and unloaded the cars they got service on the succeeding car and the amount of car service charges decreased until it was simply nominal. There are plants in this territory to-day that do not delay one-fourth of one per cent of their cars beyond the free time allowed, and they are getting service. There are plants to-day that would complain "good and plenty" if there was any change in the administration of car service by the railroads serving them. I understand the United States Steel Corporation to-day complains if the agents don't furnish them, not only with a list of the cars actually delivered, but furnish them with a list of cars they have in the yards ready for delivery which they cannot deliver because the interchange tracks are not clear. When they get the list, they soon clear the interchange tracks so as to get those cars, as advance information is valuable.

One more thing. Mr. Hurd is right; there is no question but that it would be much more pleasant for the railroad men if they had cars enough to fill their orders, but at the same time there are a great many cars in which the lading is standing and has been standing for an indefinite period, because some plants are not ready to receive them, and I can give car numbers and initials and tell just how long they have been held out from delivery. There is no question but that freight is piled up because of the failure of the railroads to furnish cars for loading at the plants; but there are cars being held with freight for those self-same plants because they are not ready to receive it. It is not a question of the amount of car service, when it comes down to a question of that kind, as the dollar is absolutely insufficient and we ought to charge $25.00.

MR. TURNER'S MOTION, extending a vote of thanks to Mr. Prall and the gentlemen who have participated in the discussion, being put to vote, was passed unanimously.

ON MOTION, adjourned.

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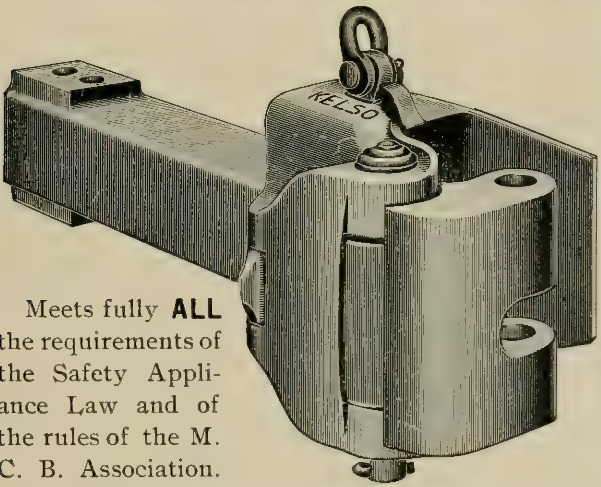

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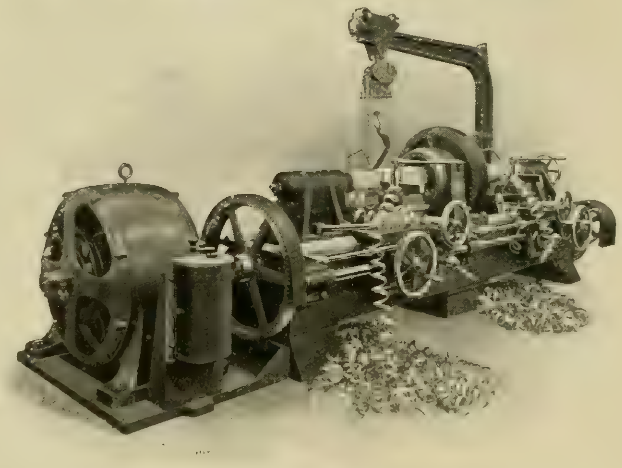

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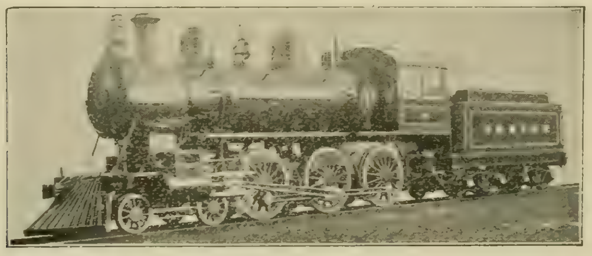

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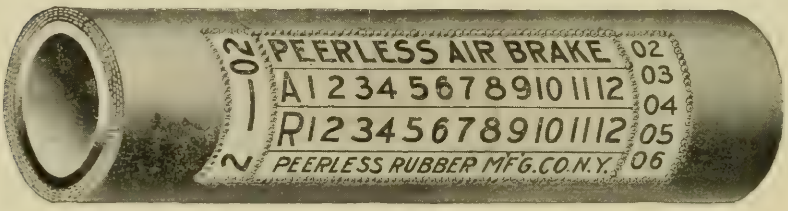
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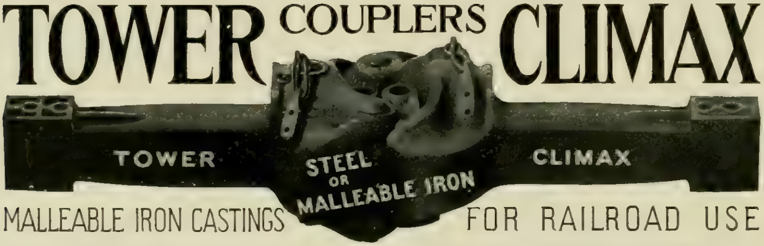

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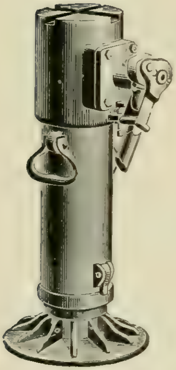

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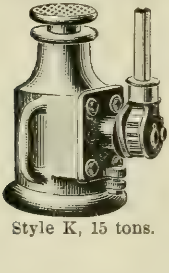

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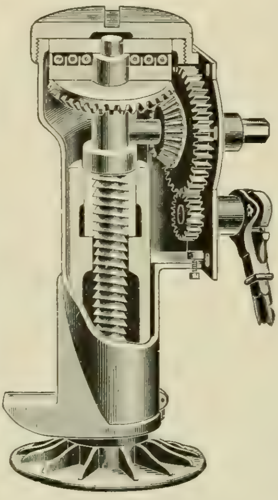

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OFFICIAL PROCEEDINGS

of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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VOL. V.
No. 2.

Pittsburgh, Pa., Dec. 22, 1905.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

DECEMBER 22d, 1905.

The meeting was called to order at 8 o'clock P. M. at the Monongahela House, Pittsburg, Pa., with President F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Allen, Harvey A.
Brand, Thos.
Branson, C. R.
Brown, Geo. P.
Campbell, G. M.
Carson, G. E.
Coates, H. T., Jr.
Comstock, E. D.
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Day, Edward B.
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Haynes, J. E.
Herman, R.
Hoffman, N. K.
Howe, D. M.
Huchel, John.
Humphrey, A. L.
Jaggard, H. A.
Kennedy, Jas.
Kessler, D. D.
Kinter, D. H.
Knox, Wm. J.
Koch, Felix.
Krause, Julius.
Lanning, J. Frank.
Laughlin, C. W.
Lee, L. A.
Lindstrom, Chas. A.
Lobez, P. L.
Long, R. M.
Ludgate, B. A.
Malloy, M. A.
Michel, Wm. J.
Murphy, W. J.
McDonnell, F. V.
McFeatters, F. R.
McIlwain, J. D.
McKee, F. E.
McMullin, F. V.
McNulty, F. M.
Ogden, Geo. D.
Orchard, Charles.
Porter, H. V.
Redding, D. J.
Reeve, F. J.
Schomberg, W. T.
Stark, F. H.
Stewart, W. W.
Street, C. F.
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Turner, L. H.
Warnock, H. R.
Weigel, F. S.
Wendt, Edwin F.

VISITORS.

Anderson, A. E.
Barhydt, J. M.
Colburn, G. S.
Davis, Jos. L.

Dolph, D. C.
Gridley, G. O.
Hudson, W. A.
Hummel, Fred.
Patterson, Robert F.
Pulliam, O. S.
Rauch, T. T.
Reading, E. E.
Renshaw, Clarence.
Turner, C. E.

PRESIDENT: The minutes of the last meeting being in the hands of the printer, if there are no objections they will stand approved as printed.

SECRETARY: We have the following proposals for membership:

NEW MEMBERS.

Bjerregaard, Emanuel, The Pocket List of R. R. Officials, 24 Park Place, New York City.

Bosworth, Edwin M., Ainsler Engineering Co., Diamond Bank Bldg., Pittsburgh, Pa.

Cardwell, J. R., President Cardwell Mfg. Co., 943 Monadnock Block, Chicago, Ill.

Dashiell, J. W., Frt. & Ticket Agt., B. & O. R. R. Co., Glenwood Station, Pittsburgh, Pa.

Freeman, C. I., Special Agent P. R. R., Room 204 Union Station, Pittsburgh, Pa.

Garland, C. W., Pass. Cond'r. Penna. Lines, Florence Avenue, Avalon, Pa.

George, M. E., Foreman Car Inspectors B. & O. R. R., Port Perry, Pa.

Kissinger, C. F., Asst. Train Master P. R. R., Thirtieth and Sarah Streets, S. S., Pittsburgh, Pa.

Lawler, John C., Supt., Trans., Homestead Steel Works, Carnegie Bldg., Pittsburgh, Pa.

McAdoo, J. H., Traf. Mgr., Harbison-Walker Co., Pittsburgh, Pa.

Millar, Clarence W., Asst. Head Order Dept., Pressed Steel Car Co., 37 Rodgers Ave., Bellevue, Pa.

Pendleton, D. D., Industrial and Power Dept., Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Pratt, R. T., Chief Supervisor, Pittsburgh Car Service Asso., 418 Westinghouse Bldg., Pittsburgh, Pa.

Pulliam, O. S., Gen. Mgr., Pittsburgh Equipment Co., 541 Wood Street, Pittsburgh, Pa.
Quinn, H. M., Sup't., Pressed Steel Car Co., McKees Rocks, Pa.
Ryan, William F., Car Foreman, B. & O. R. R. Co., 100 Generta Street, Pittsburgh, Pa.
Stoddart, Jas. T., Trav. Salesman, Thos. C. Jenkins, 2700 California Avenue, Allegheny, Pa.
Turnbull, Davis F., Wickes Bros., Pittsburgh, Pa.
Turner, Walter V., Mech. Engr., W. A. B. Co., General Office, Wilmerding, Pa.
Williams, W. F., Chief Clerk, Pittsburgh Car Service Asso., 418 Westinghouse Bldg., Pittsburgh, Pa.
Coen, P. A., Pittsburgh Coal Co., 232 Fifth Avenue, Pittsburgh, Pa.

PRESIDENT: These gentlemen will become members, when approved by the Executive Committee.

PRESIDENT: We will at once take up the subject of the evening, and it gives me pleasure to introduce to you Mr. Renshaw, who will now occupy the time, after which the paper will be open for discussion.

The Single Phase Electric Locomotive for Heavy Passenger and Freight Service.

BY MR. C. RENSHAW, WESTINGHOUSE ELECTRIC & MFG. CO.

The remarkable success of the electric motor in the operation of street cars and the rapidity with which electricity superseded all other forms of motive power for this service gave rise a long time ago to the popular idea that some day this new power would also supersede the steam locomotive and operate the freight and passenger traffic of trunk line railroads.

It was long ago recognized that were the electrical operation of such roads commercially feasible, many advantages would result both to the railroads and to the public. The electric locomotive is in general simpler in its construction and easier to handle and operate. The idea of mounting a steam power plant on wheels and driving it along at 75 or 80 miles per hour would seem ridiculous to us were we not already familiar with it and having such an outfit, it is not surprising that about one month out of every twelve must be devoted to overhauling and repairs. High grade men are required to operate and care for it and coal and water stations must be established at intervals along the road.

Electric locomotives, on the other hand, can be operated much more easily and need lose very little time for overhauling and repairs. The source of power also need not be located along the track, but can be put in almost any convenient place

To the general public it may seem at times that the railroads are slow in considering and adopting electric operation, but as much as fifteen years ago, the use of direct current motors was seriously considered by several different railroad companies and careful investigations were made in several instances as to the cost and advisability. In general, however, although some lines were equipped at that time, it was decided that the time was not yet ripe for electrification. The investigations in these cases were for the most part with reference to suburban service and to the use of motor cars with or without trailers, following in general, ordinary street railway practice though on a larger scale.

When the construction of the Baltimore & Ohio tunnel was considered, the necessity for preventing smoke and gases led to the adoption of electrical operation for hauling trains through it. As the tunnel was intended for through trains, however, ordinary motor car operation was not permissible and electric locomotives capable of doing the same work as the heaviest steam locomotives were developed.

These locomotives, although entirely successful, only served to show the impracticability of operating steam railroad service with direct current motors except in special cases on account of the difficulties of transmitting the power, and although there have been many hopes from the choice of electric locomotives in this case, the fulfillment of the popular idea regarding the general use of such power was still postponed.

The development of the single phase alternating current railway motor has now overcome the one inherent difficulty in the operation of electric locomotives for heavy passenger or freight service and for the first time, a really practicable system for the electrical operation of trunk line service is available.

The advantage of the single phase system for the operation of the locomotives lies in the fact that alternating current is used, and that with this current transformations of voltage can be readily made. Thus power can be supplied to a locomotive at a high voltage so that a given amount of power requires only a small current and this current can be readily transmitted. The voltage can then be transformed on the locomotive to any suitable lower voltage for use at the motors.

The speed of such a locomotive with a given load depends on the voltage at the motors and the same transformer can be arranged to give any desired number of voltages so that the locomotive may be run at a wide range of speeds.

The first large locomotive of this type ever built is shown in Fig. 1. This locomotive was built by the Westinghouse Electric & Mfg. Company in the early part of the present year in order to demonstrate the practicability of the system.

The weight of the locomotive complete is 135 tons. It is built in two parts, each having one six-wheel truck with rigid wheel base. The two halves are coupled together and are intended to operate normally as a single unit, but each half may be operated separately if desired. The locomotive is approximately 45 feet long over all and 9 feet 8 inches wide. The total height above the rail with trolleys lowered is 17 feet. The wheels are 60 inches in diameter and are mounted on 8 inch axles with 6 feet 4 inches between centers. The side frames of the truck are of cast steel and are spring supported in the usual manner, the weight on the two inside axles of each truck being equalized. The cabs are built of sheet steel with angle iron supports and the entire cab as a whole is removable from the truck.

Each axle carries a 225 h. p. single phase series motor of the single reduction geared type, making a total of six motors for the locomotive. One side of each motor is supported directly on the axle and the other suspended by spiral springs from the locomotive body. The motors are so arranged that forced ventilation may be used and increased output thus secured.

The locomotive is designed for a trolley voltage of 6,600 and a current of 25 cycles per second. The 6,600 volt current is

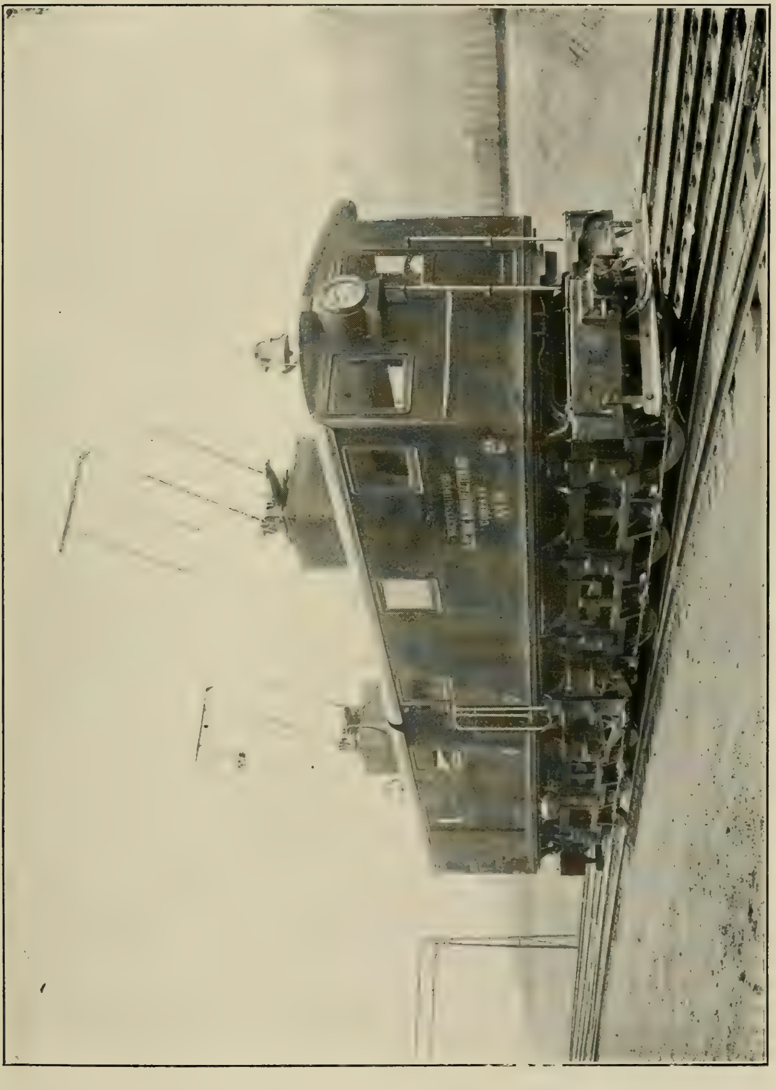

FIG. 1.

collected from the trolley wire by a pneumatically controlled pantagraph trolley on each half of the locomotive and is carried through a suitable oil switch and circuit breaker to a transformer in each cab. These transformers reduce the voltage from 6,600 to 325 for use at the motors. The trolleys may be raised or lowered from the cab by a suitable air valve.

Forced ventilation is used with the transformers as well as with the motors and the necessary air is supplied by suitable motor driven blowers. Compressed air is supplied for the brakes and operation of the controlling devices by means of motor driven compressors.

The locomotive is designed for slow speed freight service, this type having been chosen because the design of such a locomotive for very slow speed service presents more difficult problems than the design of a locomotive of equal capacity for high speed conditions. This locomotive having been successfully designed, the production of similar ones for passenger service becomes a relatively simple matter.

With the motors working at nominal full load, the locomotive will develop a draw bar pull of 50,000 pounds at a speed of approximately 10 miles per hour. On several occasions, however, steady pulls of from 60,000 to 65,000 pounds have been recorded on the dynamometer car and momentary efforts as high as 100,000 pounds have been attained with no sign of slipping of the wheels. Sand was, of course, used under these latter circumstances. With lighter loads the locomotive may be run at higher speeds up to a maximum of about 30 miles per hour.

Speed control is secured by connecting the motors to various taps on the transformer and nine different speeds with any load may be secured in this way.

One of the most striking points about this and similar locomotives is the fact that the small current required, permits their operation from an overhead trolley less than 0.4 of an inch in diameter. This trolley may be placed overhead out of the way, similar to that used for the operation of street cars. A test made with one-half of this locomotive hauling a train of fourteen cars weighing 818 tons show a maximum current from the line when starting of only 125 amperes, and when up to speed the current required was only about one-half of this amount.

Such a train could easily be supplied with power from a No. 3-0 trolley wire with no additional feeders at a distance of ten miles from the power station and a road operating trains of this sort need have transformer feeding stations no closer together than the rotary converter sub-stations of the ordinary interurban electric line of the middle west.

Fig. 2 shows a view of the same locomotive hauling a train of 50 steel gondola cars. These cars were empty, but were new and stiff, requiring on this account almost as great a draw bar pull as if loaded.

Fig. 3 shows a view of the interior arrangement of a locomotive of slightly different form and gives a general idea of of the arrangement of apparatus in the interior of the cab.

Fig. 4 shows one of the motors together with its axle and wheels. The supporting springs, by means of which the front of the motor is attached to the body of the truck, may also be seen in this view.

Fig. 5 shows the motor with axle and wheels removed and with a gear case out of the way and gives a somewhat better view of the motor.

Fig. 6 shows the motor with armature removed and gives an excellent idea of the arrangement of coils on the interior.

Fig. 7 shows the armature complete.

The trolley for collecting 6,600-volt current from the wire is shown as it appears when raised for use in Fig. 8, and Fig. 9 shows how it may be shut down out of the way when the locomotive is not in operation. This trolley is entirely under the control of the operator and may be raised or lowered by turning an air valve.

The use of high voltages on the trolley wire and the use of an overhead trolley for supplying power to an important railway system necessitates a more substantial and reliable line construction than is ordinarily used with direct current trolley systems. Such a line construction is shown in the following views.

In open country where only a single or double track is equipped with trolley wire a construction such as shown in Fig. 10 is employed. Wooden poles are used equipped with iron brackets as shown in Fig. 11. On each bracket is mounted a heavy porcelain insulator shown in Fig. 12. Around the center of this insulator is placed a malleable iron hanger, Fig. 13. These poles and insulators are ordinarily placed 120 feet apart and a 7-16 in. steel cable called a "messenger cable" is hung from the malleable iron hooks on the insulators. Should the

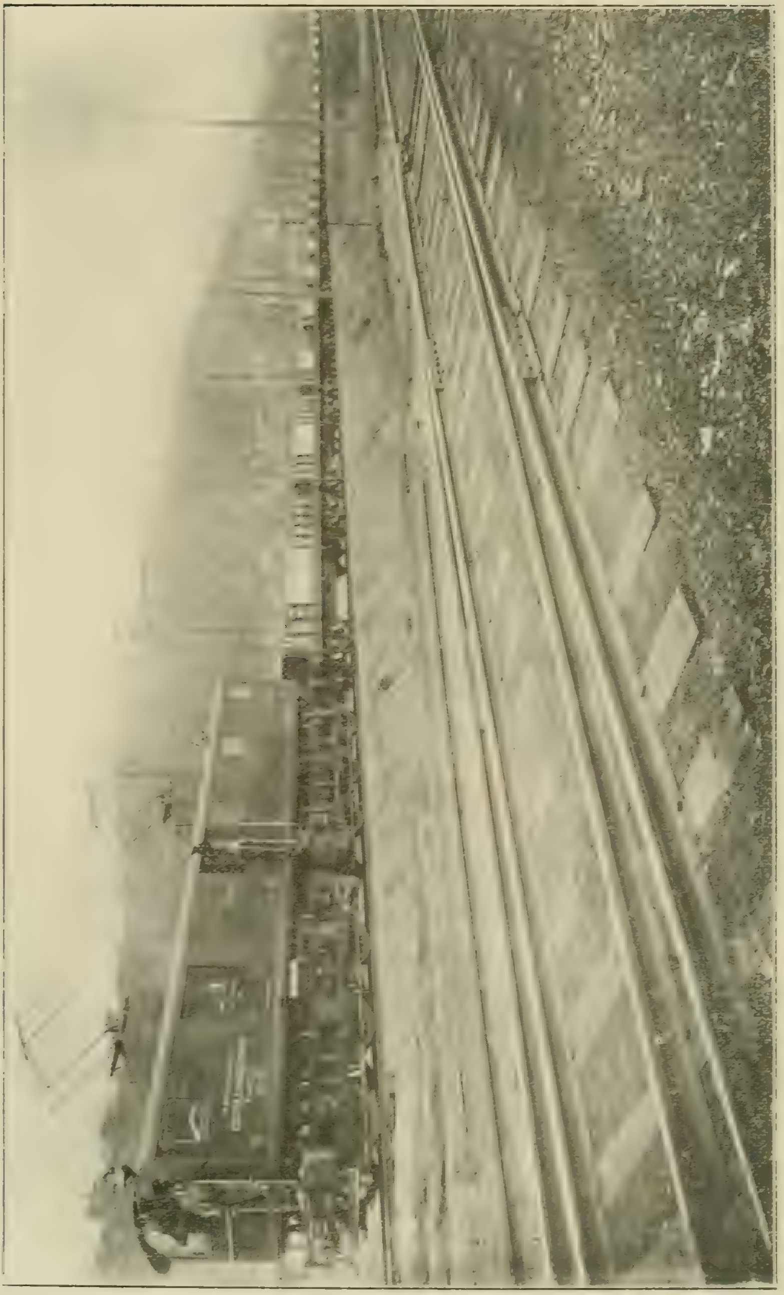

FIG. 2.

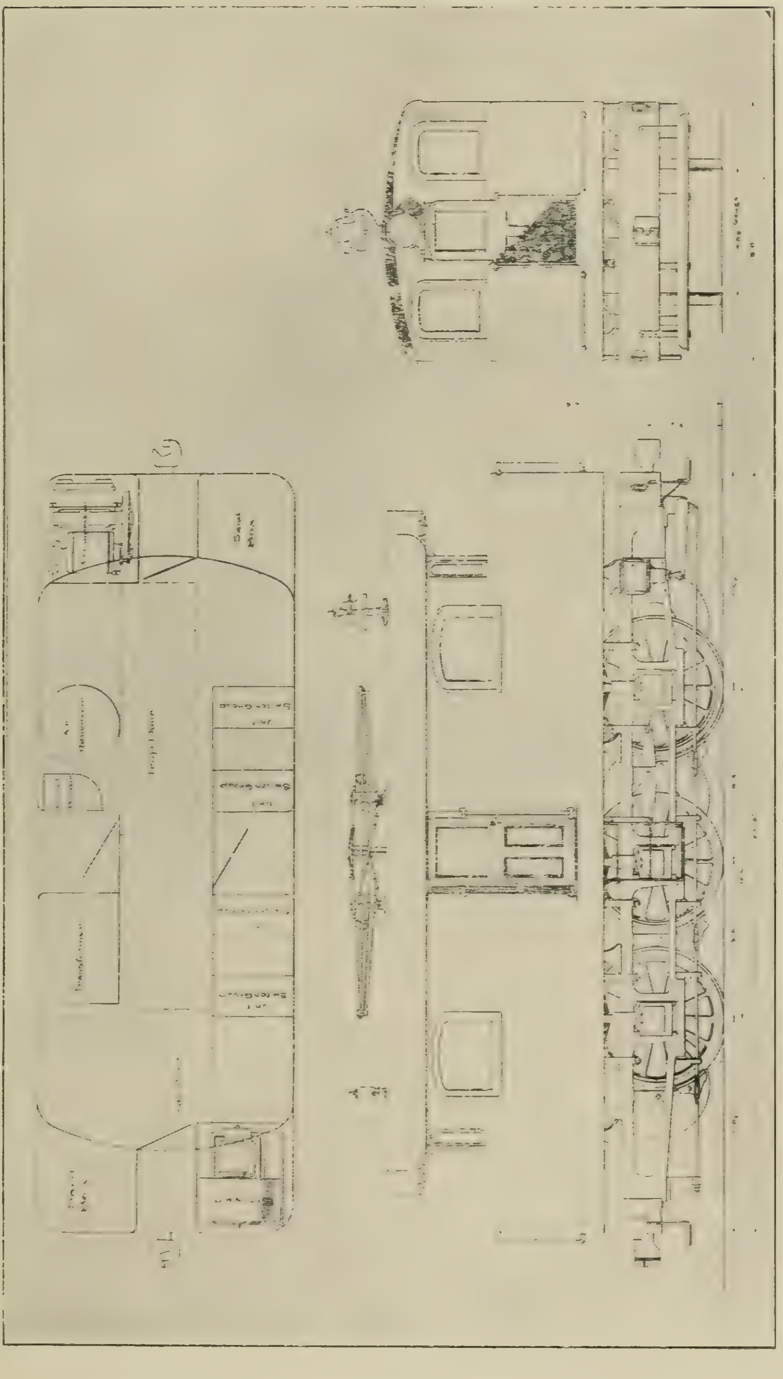

FIG. 3.

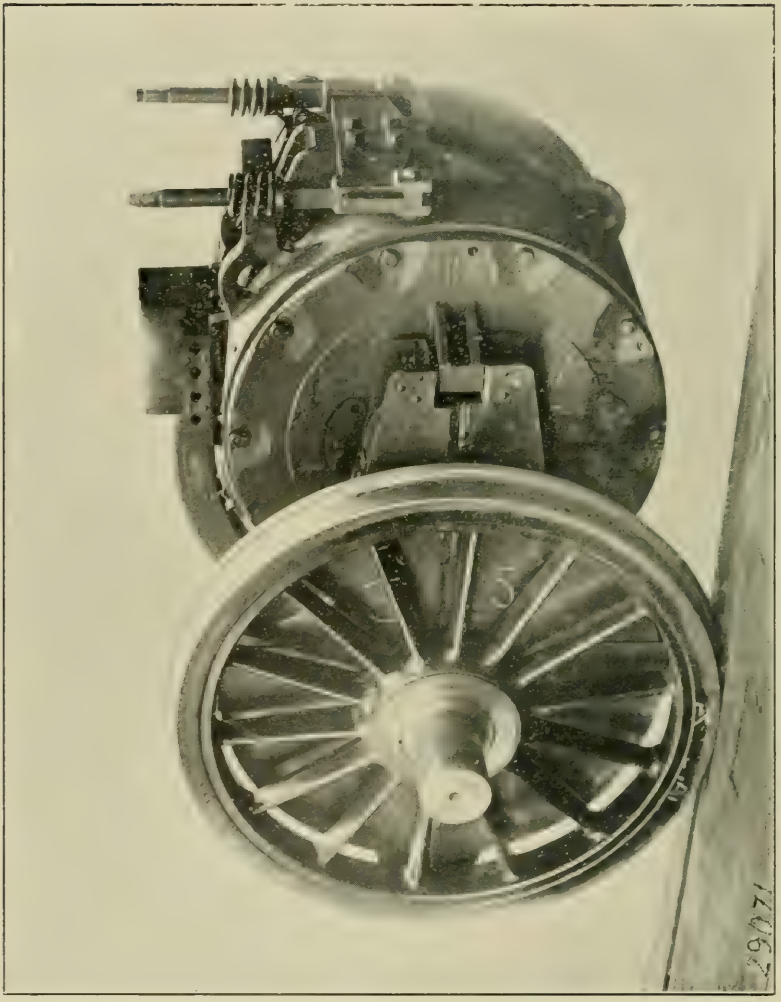

FIG. 4.

hook or insulator break, the wire would be caught by the guard loops shown on the view of the insulator.

From this cable the trolley wire is supported at intervals of ten feet by hangers such as are shown in Fig. 14. These hangers are made of different lengths and so arranged that while the steel messenger cable hangs with its natural sag, the trolley wire is maintained parallel to the track.

At intervals of about 1,000 feet on straight track, or oftener

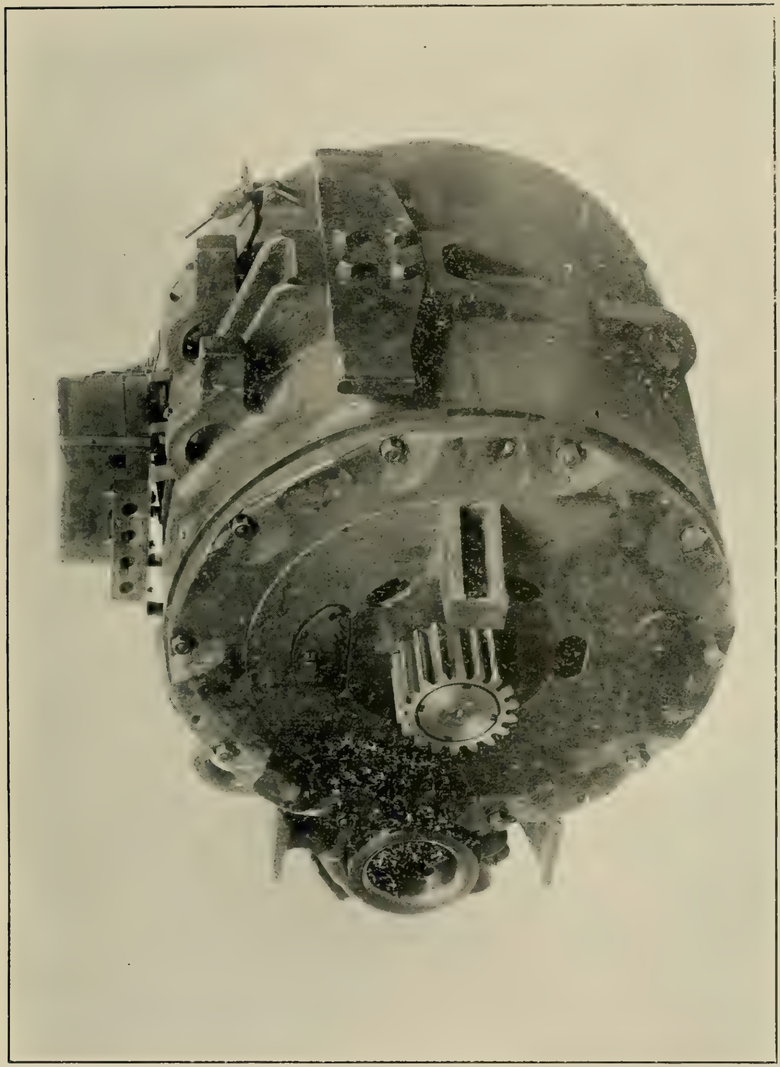

FIG. 5.

on curves, the trolley wire is braced against side swing by supports such as are shown in Fig. 15. These may be seen in the view of the line shown in Fig. 16. Sharp curves are secured to an insulator such as is shown in Fig. 17, which is fastened to a pole by the long bolts attached to it.

Wherever it is desired to insulate one section of trolley

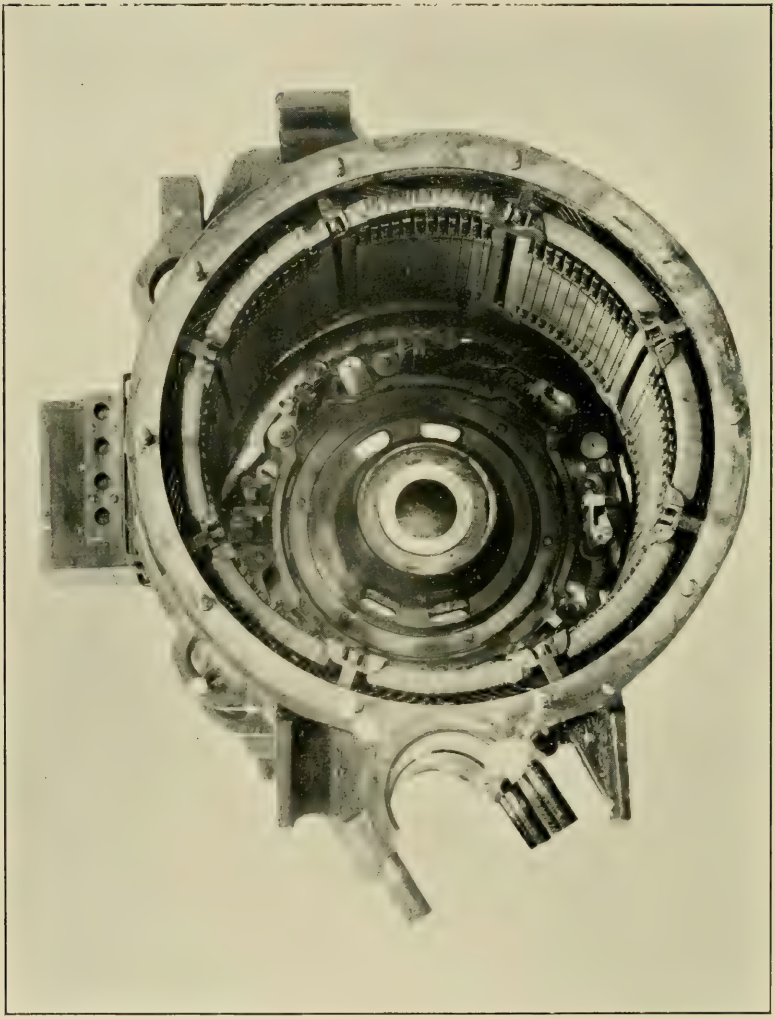

FIG. 6.

from another, a section insulator such as is shown in Fig. 18 is used.

The construction described above and shown in the figures is in general sufficient for use in open country. Where a more rigid construction is desired, iron poles may be used instead of wood and two suporting cables instead of one. A photograph of such a line is shown in Fig. 19.

In freight yards or similar places where more than two

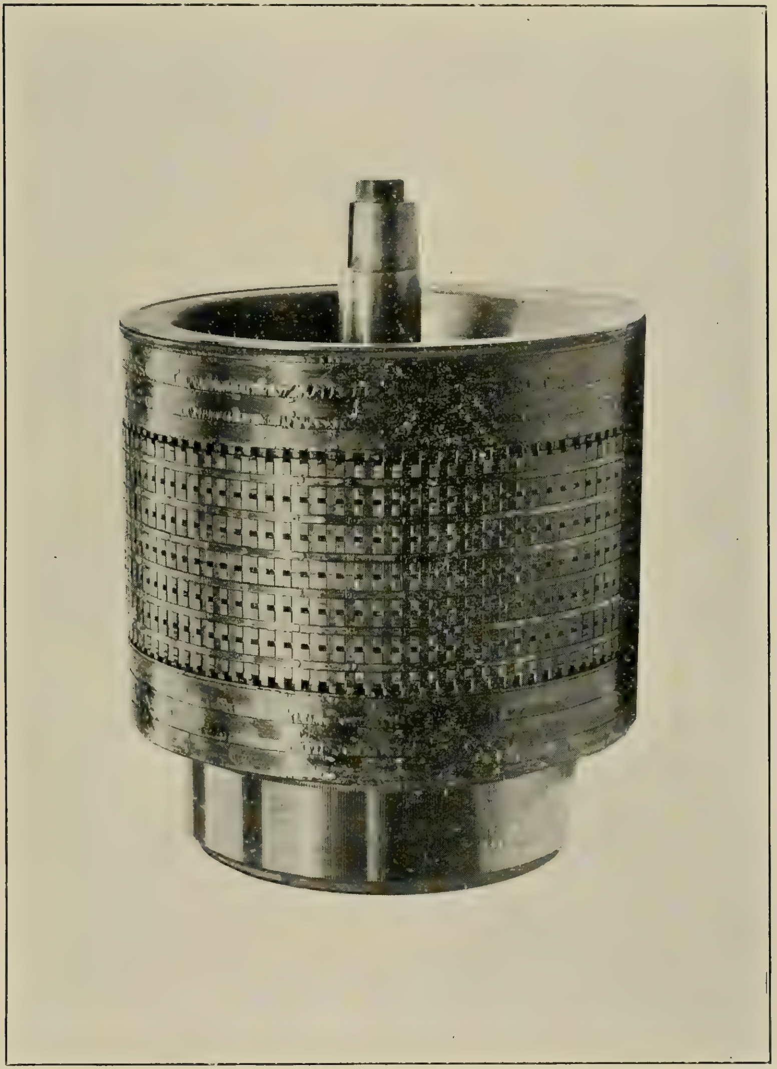

FIG. 7.

tracks are required, a construction using iron bridges such as are frequently used at present for supporting signals may be employed. A general view of this construction is shown in Fig. 20 and the method of supportnig the messenger cables in Fig. 21. These bridges may be placed about 400 feet apart.

Both the locomotive and the construction described above

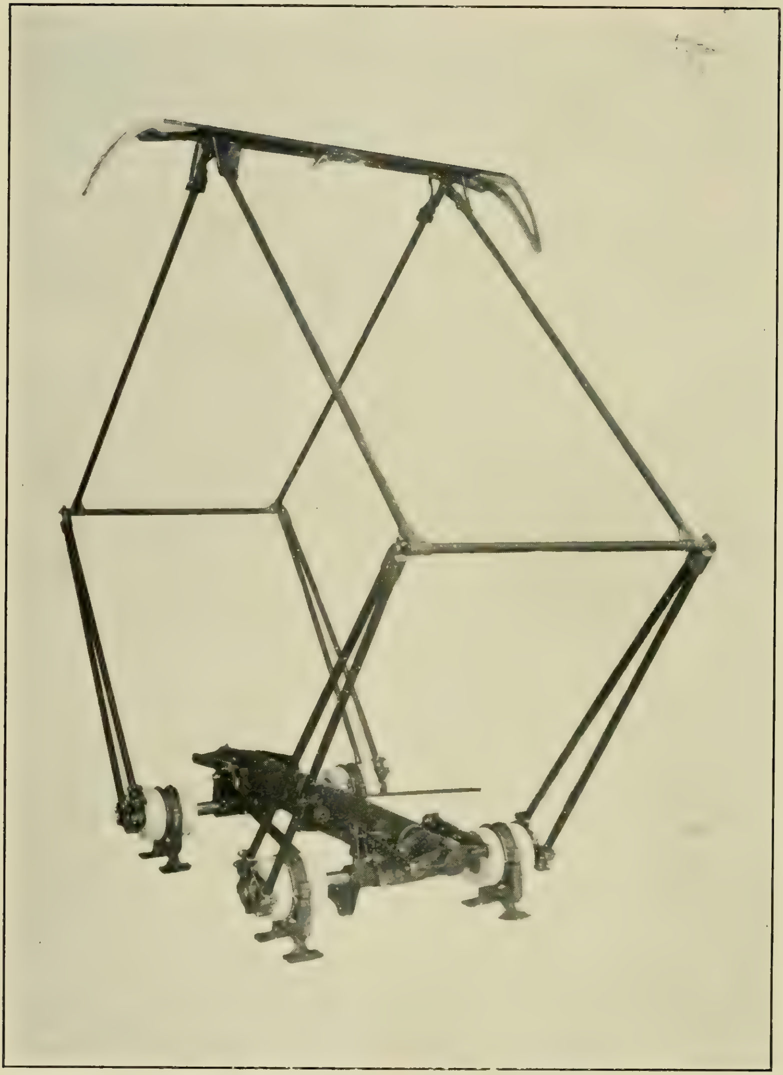

FIG. 8

may, of course, be modified to meet unusual or special conditions. The apparatus as described, however, may be regarded as typical. It has actually been built and operated and there is no doubt as to its success. This locomotive and the necessary details of line construction and auxiliary devices for its operation were completed less than a year ago. Twenty-five such

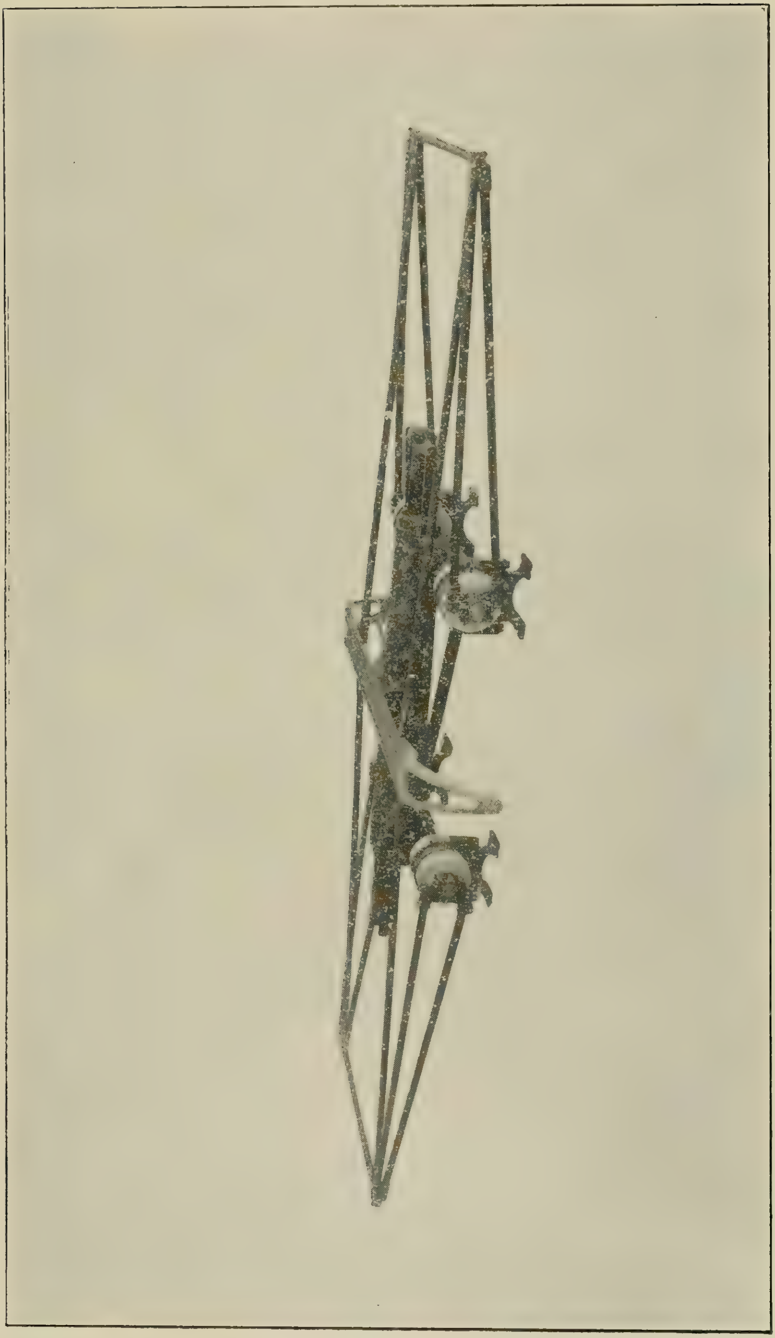

FIG. 9.

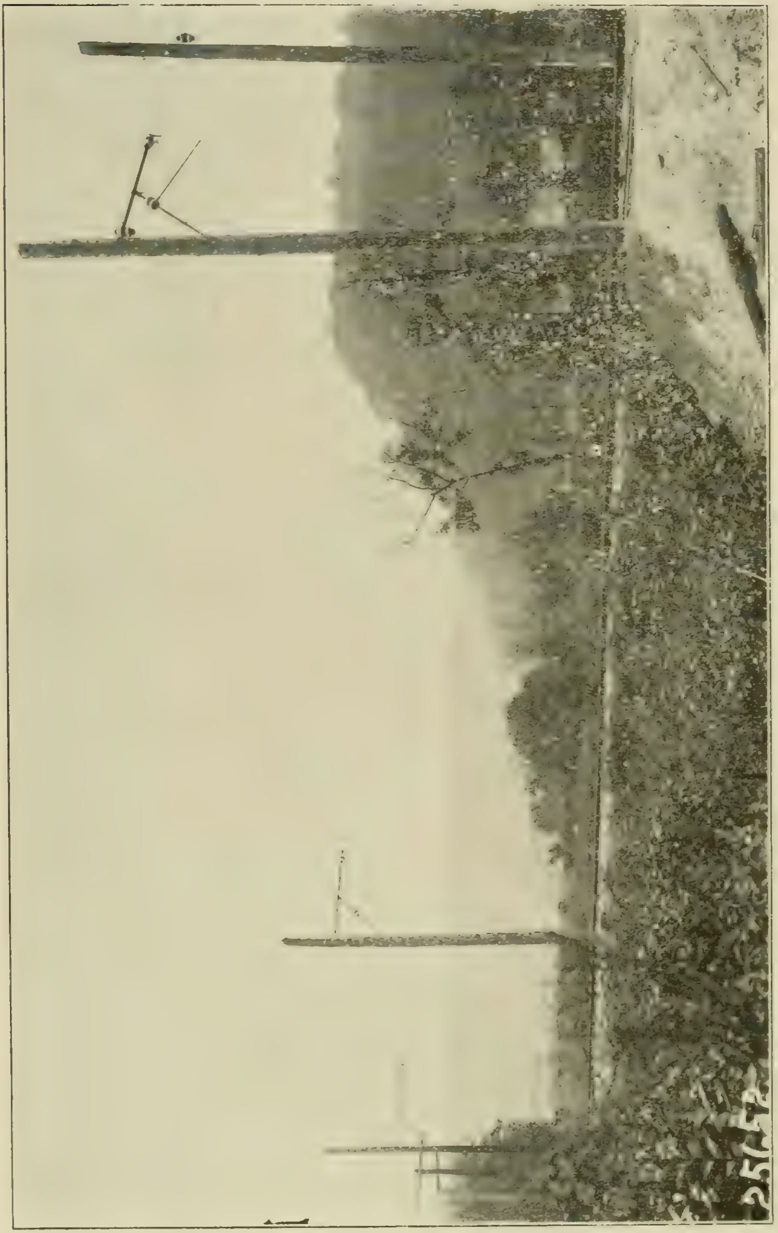

FIG. 10.

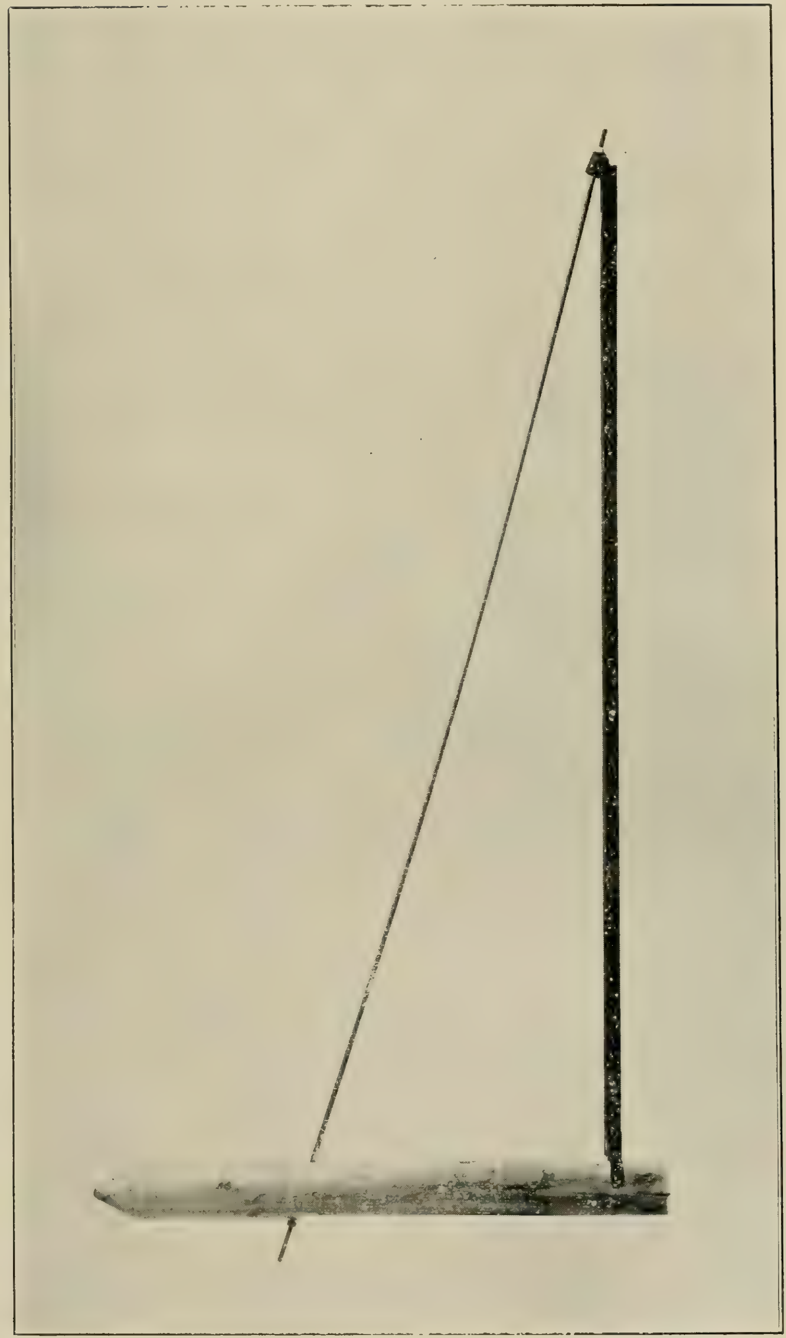

FIG. 11.

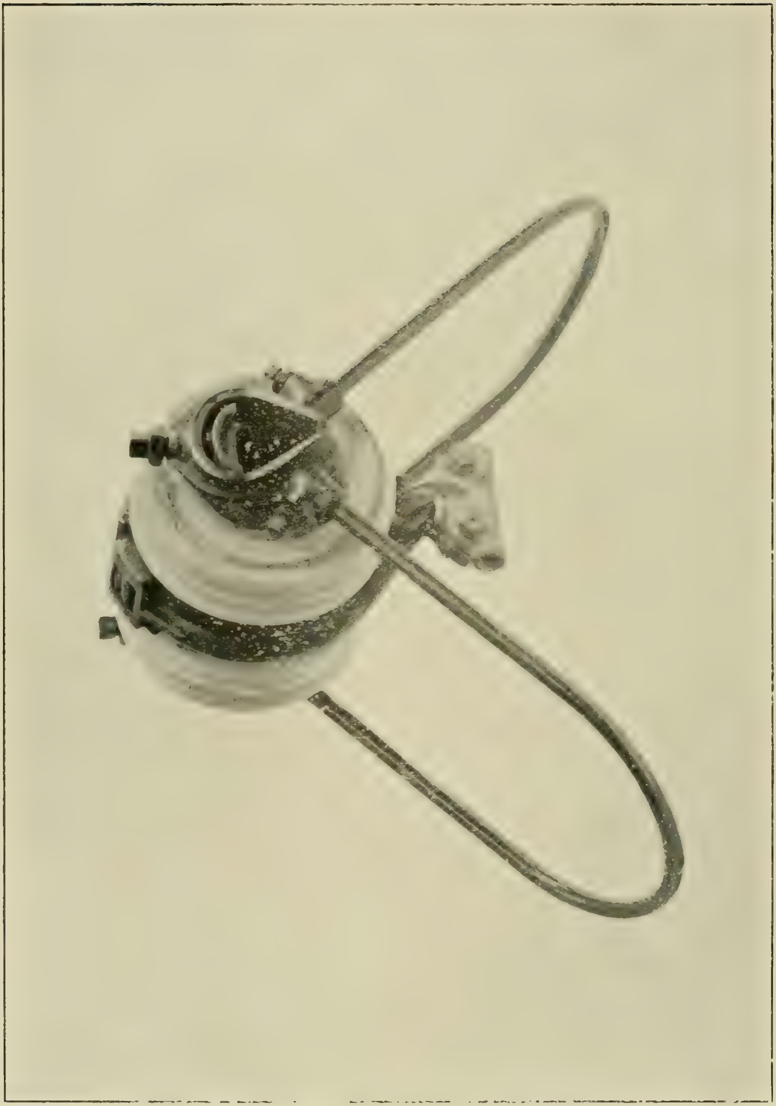

FIG. 12.

locomotives have already been contracted for by the New York, New Haven & Hartford Railroad and estimates and investigations are being made by a number of other roads. That many advantages could be obtained from electrical operation of many lines now operated by steam locomotives has long been ad-

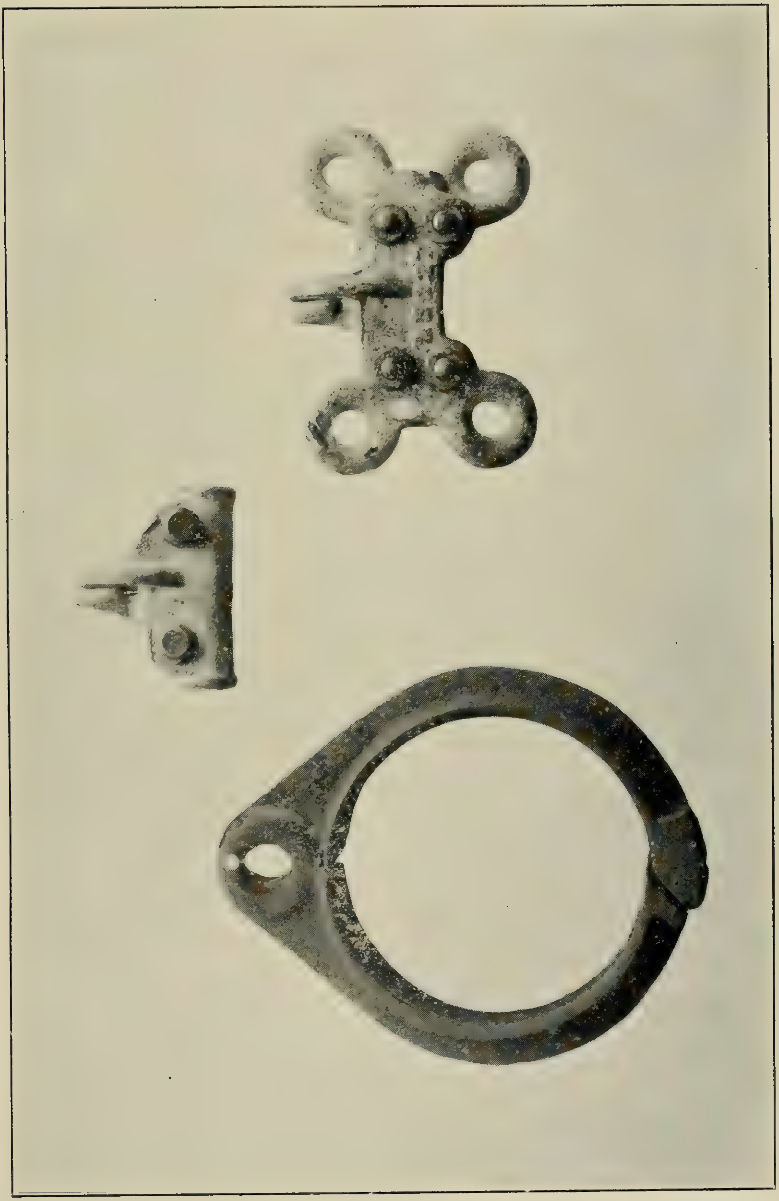

FIG. 13.

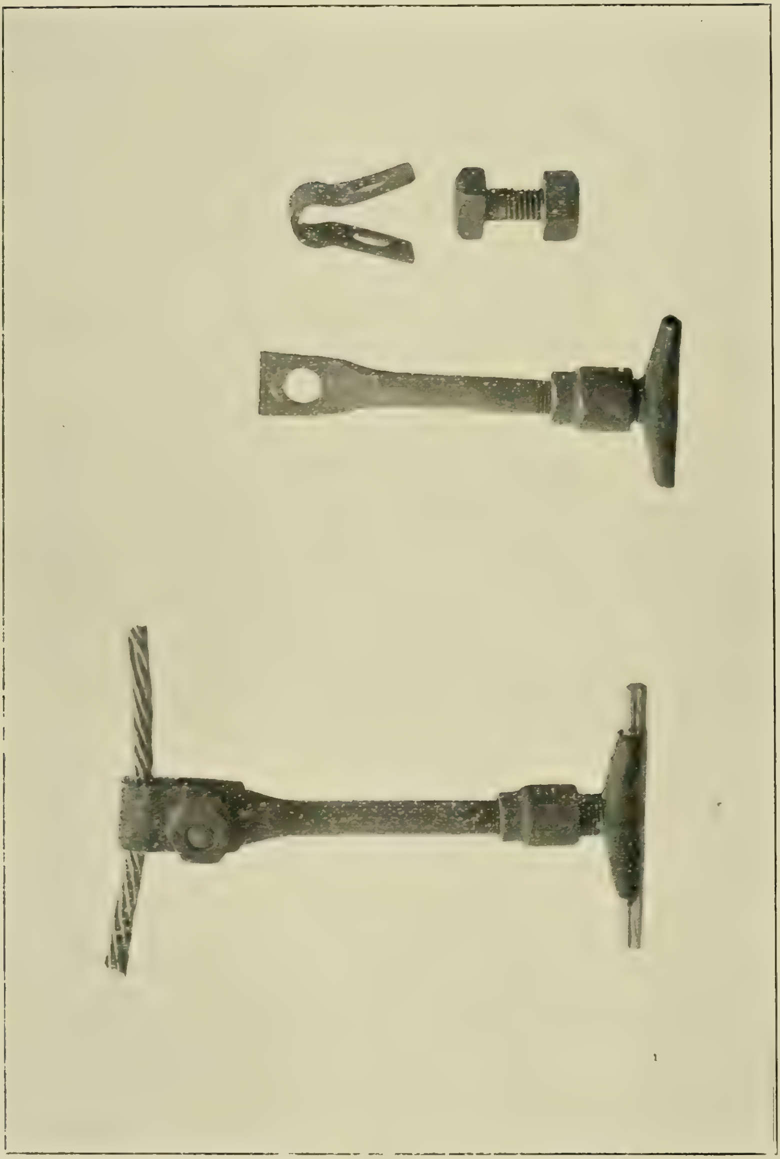

FIG. 14.

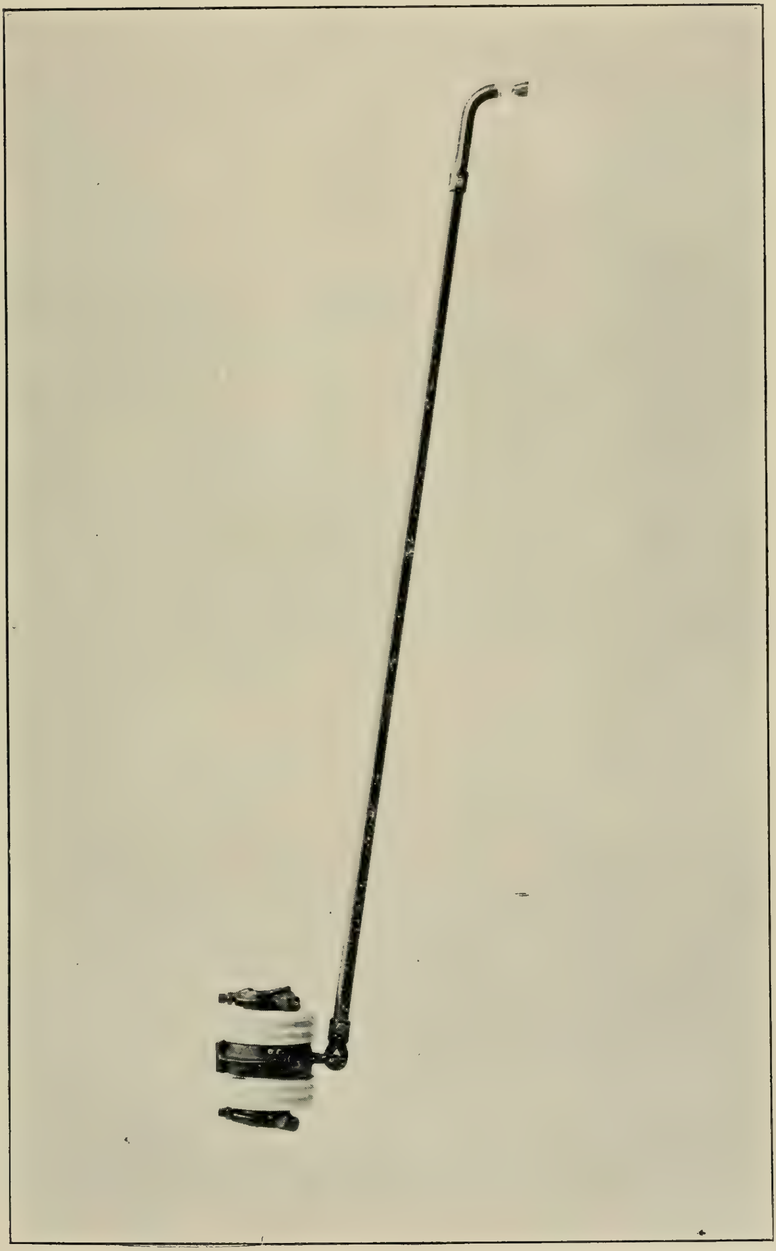

FIG. 15.

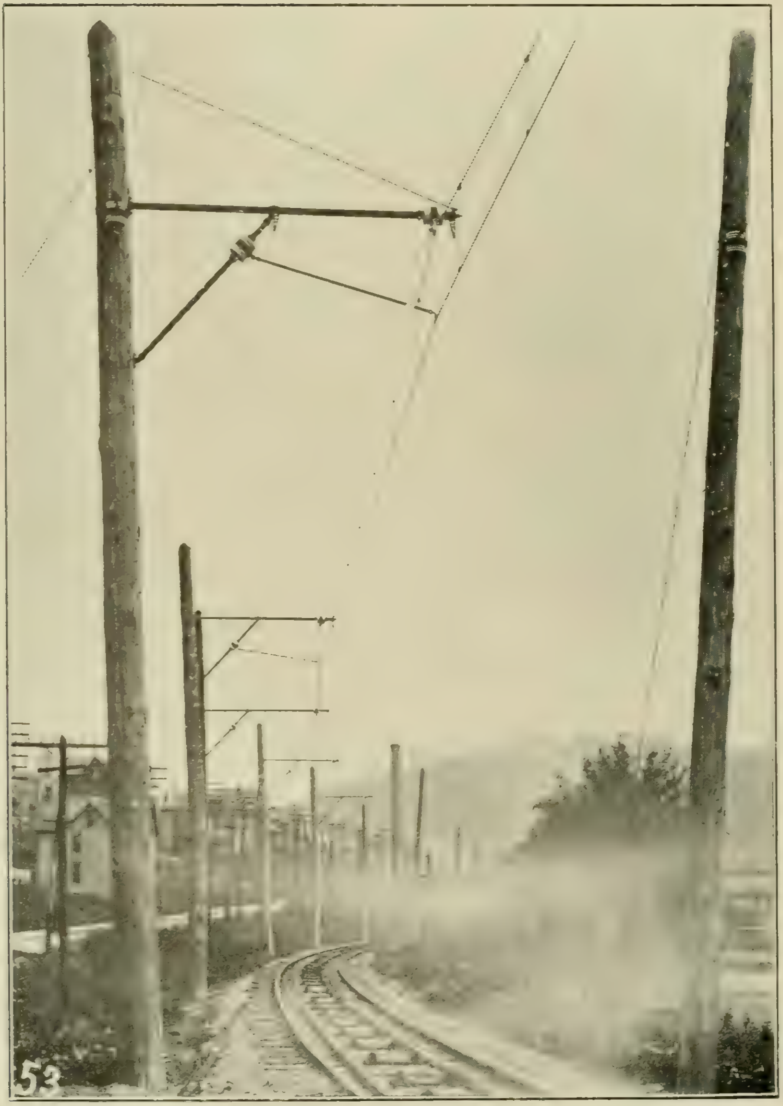

FIG. 16.

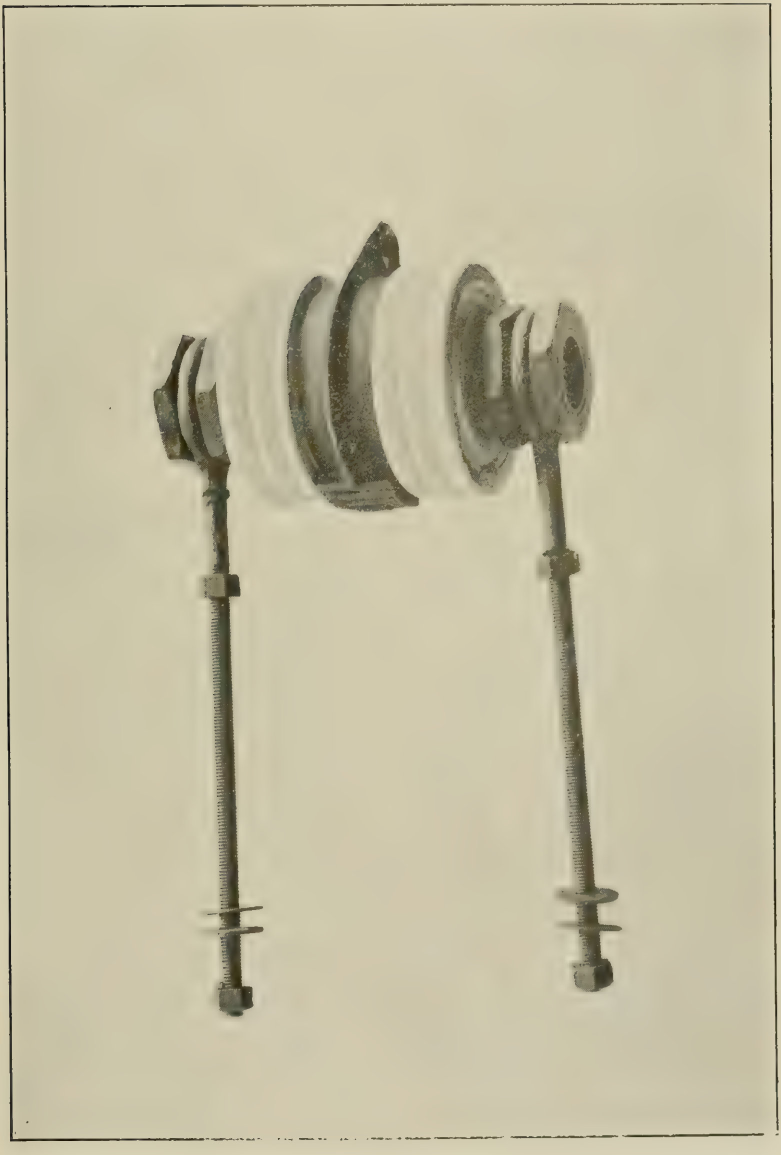

FIG. 17.

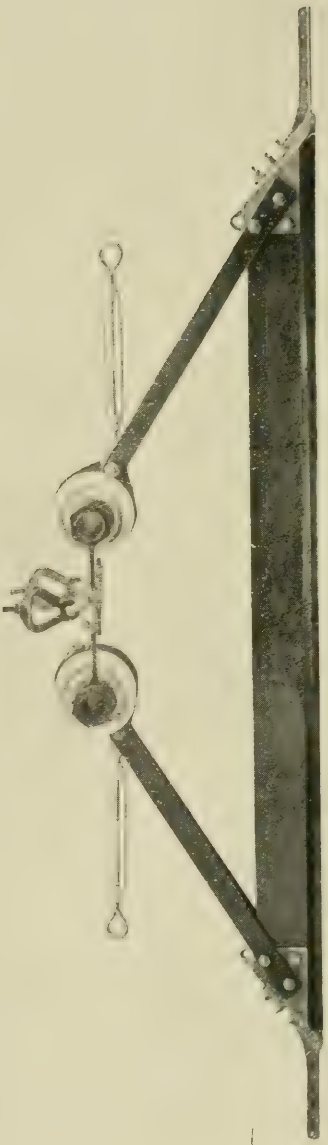

FIG. 18.

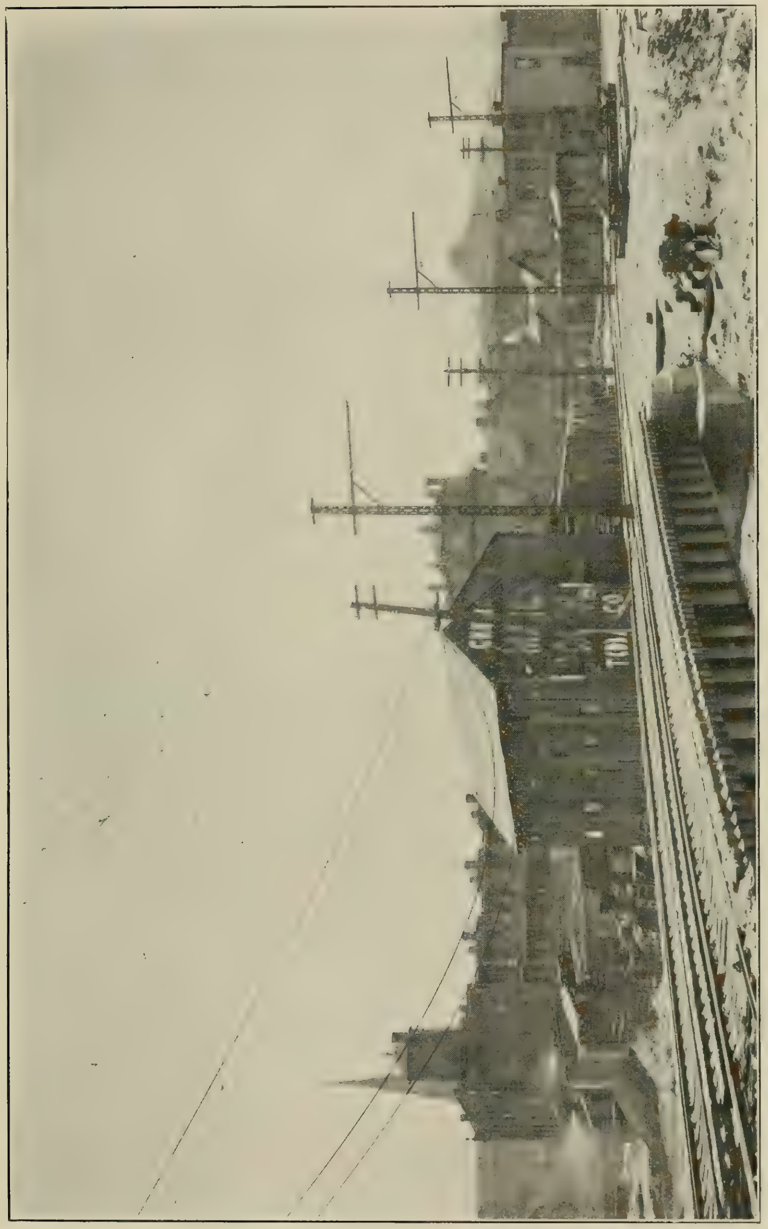

FIG. 19.

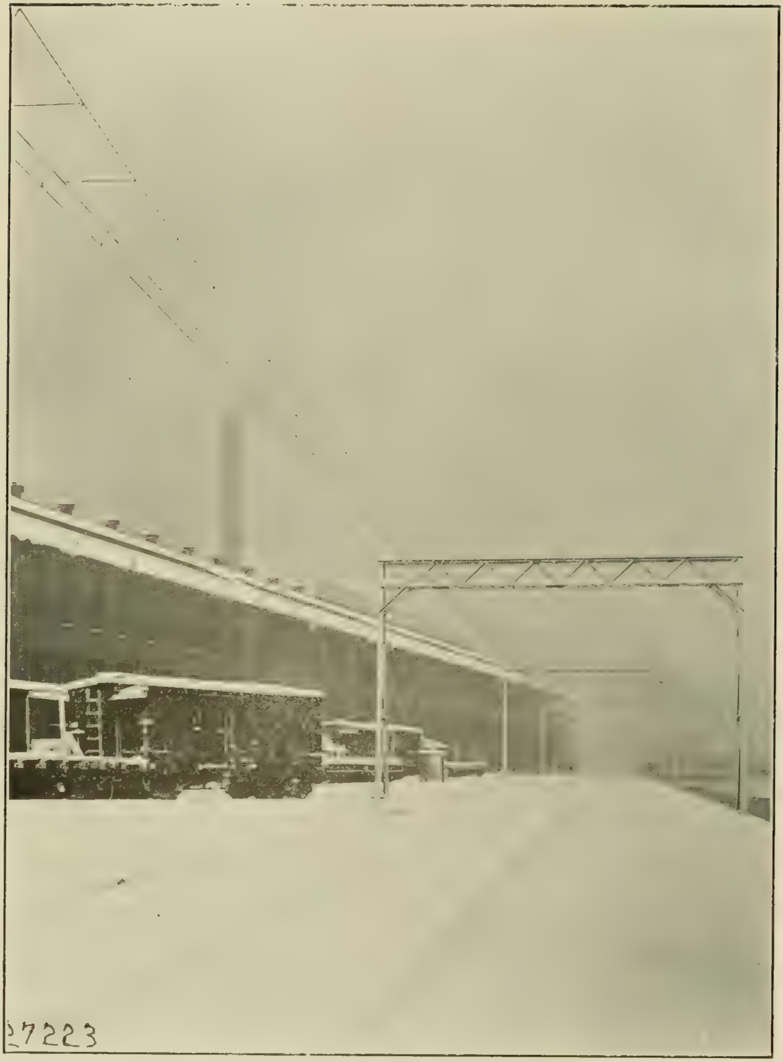

FIG. 20.

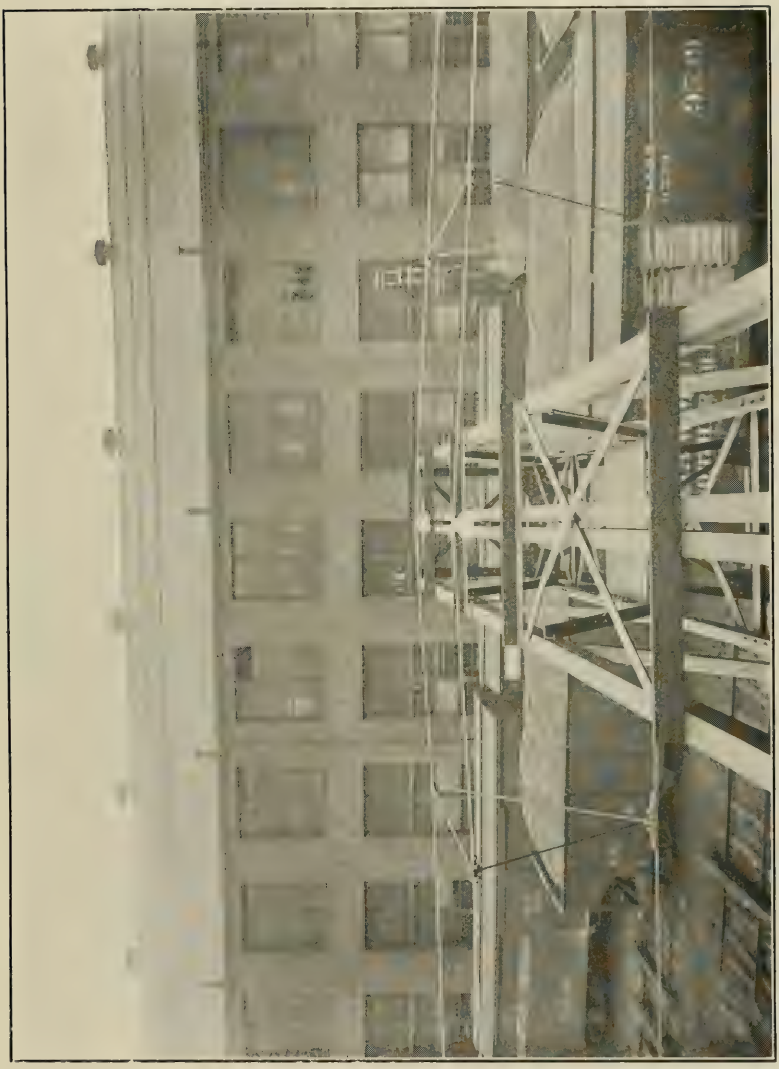

FIG. 21.

mitted and the perfection of the single phase system now supplies the necessary means for their practical realization.

PRESIDENT: You have heard this very interesting paper on the subject of electricity, and I trust that we have some of our electrical friends here who will take up the subject; it is now open for discussion.

MR. L. H. TURNER: It seems to me that the future of the electric locomotive depends on its ability to reduce the cost of transportation. While I am not able to discuss the paper, I would like to ask what the relative cost is between the electric 45,000 tractive power,—that is the relative cost per train mile in comparison with the engine of a similar size. If there is no reduction in the cost of transportation there must be some other advantages derived from its use and I would like some information on that point.

MR. C. RENSHAW: I have not attempted to explain the advantages of electric operation over steam because I considered that question as outside of the subject assigned to me for this evening. The actual cost of operation in dollars and cents is an exceedingly difficult matter to predict for any given case because it depends upon so many variable quantities both for steam and electric operation. Practically no two steam roads show the same operating cost and the cases of electrical operation under steam railroad conditions now in existence are so few that it is impossible to give any specific statement in regard to the cost of electric operation without knowing the exact conditions. There are, however, a large number of general considerations which will, I think, show why we may expect a lower operating cost with electricity than with steam.

One of these considerations is the matter of overhauling and repairs. A steam locomotive is self-contained and repairs to any particular part of it, even a comparatively small part, usually necessitates the laying up of the entire locomotive during the progress of the repairs. With an electric locomotive, however, the power is divided into several units and an accident to any one of these need not tie up the entire locomotive. For instance, on the locomotive which I have just described, there are six motors and in case of damage to any one of them, the damaged motor can be taken off and a duplicate one put in its place. It is the ordinary experience with large electric passenger cars, of which there are hundreds in operation, that a comparatively small proportion of the total time of a car is lost by waiting for repairs in the shop while a steam locomotive ordinarily loses quite a large percentage of its time undergoing overhauling and repairs.

Another way in which a saving is made in electric operation is by the omission of certain indirect auxiliaries. Among these may be mentioned coal and water stations, turn-tables, and equipment of that sort. The establishment of coal station and water stations is expensive and such stations require constant attendance. In many cases, also, they have to be located at points where it is more or less difficult to get the coal and water to them and in such cases, large outlays are sometimes required for their establishment. The electric locomotive requires nothing of the sort.

Turn-tables are not necessary because electric locomotives will operate equally well in both directions.

Another item is that of wiping and cleaning, dumping out the fires and cleaning out the ash-pits, and there are a thousand and one incidental matters of this sort, some of them large and some of them small, which might be mentioned as being omitted in electrical operation and thus saving a large sum.

MR. G. M. CAMPBELL: The question of electric locomotives is certainly a live one and the paper read by Mr. Renshaw brings up a number of interesting points, especially in connection with the various details of the equipment, information new to most of us. As the speaker pointed out, there are a number of drawbacks in the ordinary direct current system especially the use of a relatively low line voltage. As most of you know, the power that is transmitted varies as the product of the current and voltage, so if you raise the voltage you decrease the current and line losses are proportionate to the current. The alternating current system enables this to be done by using relatively high voltages for line distribution thereby using a small current and getting rid of heavy line losses, greatly increasing the general efficiency.

Before the single phase motor, referred to by the speaker, was brought out, the attempts at getting a good motor of that type were failures. What are known as polyphase motors have been used to considerable extent in Europe and quite satisfactorily, but the objection to them is that cost of line construction for the two to four wires was too heavy, the great advantage of the single phase motor is that a single overhead line is all that is necessary, the return circuit being the usual ground return.

There is one point that the speaker did not refer to that is of some interest, that is that this single phase alternating current electric locomotive can be used under certain conditions on the direct current line, so that these A. C. locomotives can run over their own line outside the city directly onto the ordinary city power lines, using D. C. power. While they may not work with the same efficiency yet for terminal facilities they work entirely satisfactorily.

MR. H. A. JAGGARD: I would like to ask Mr. Renshaw a few questions. First, what is the tractive power of the single phase motor taking an E 2 engine as unity, 22400 tractive power, what is the ratio? Second, Will you be good enough to elucidate the difficulty they had at the Grand Central Station, New York, as between the New York Central and the New York, New Haven, and Hartford?

MR. RENSHAW: The principal difficulty between the New York Central and the New York, New Haven & Hartford Railroads arose from a difference of opinion. The New York Central took up the question of electrifying thirty miles of lines about three years ago, before the single phase system had been fully perfected. It was necessary for them to electrify that portion of their track on account of an accident in the Park Tunnel due to smoke which so aroused public opinion in regard to the smoke nuisance in this tunnel that it was necessary to do something to improve the condition. The only means of doing away with the smoke seemed to be to do away with the steam locomotives.

The direct current was then the only system which was available and so extensive plans were made for using direct current locomotives for hauling the through trains and direct current motor cars for operating the suburban service.

The tracks and station belong to the New York Central and the burden of the problem was thus on them. The New York, New Haven & Hartford delayed purchasing locomotives for two years later than the New York Central, and during this interval the single phase system was perfected. When they did consider the purchase of electric locomotives, the single phase system showed such great advantages both in regard to first cost and cost of operation and was so flexible with regard to the matter of extensions that it was decided to purchase single phase locomotives instead of direct current ones. The locomotives, however, were to be arranged so that they could be operated on direct current as well as alternating and could thus run over the New York, New Haven & Hartford track with alternating current and over the New York Central tracks with direct current.

The advantages of the single phase system were carefully investigated by the New York, New Haven & Hartford Railroad, but apparently were not fully understood by the New York Central. One particular member of the electric commission of the latter railroad, not being familiar with the alternating current system apparently, came out in the technical papers with a long article claiming that its adoption by the New York, New Haven & Hartford was a great mistake.

This gentleman was very careful to say that he took this stand, not as a member of the New York Central Electrical Commission, but in his private capacity as an engineer. His standing in the electrical profession, however, was such that the article received the same consideration as if it had been issued by the New York Central Railroad Company and a lengthy discussion ensued.

The principal objection which he made to the single phase system was based on the fact that he did not think single phase locomotives could be built to do what the New York, New Haven & Hartford locomotives had been guaranteed to do. That point being laid aside, the next statement was to the general effect that even if the locomotives should have a satisfactory performance, it would be very difficult to operate multiple unit cars by alternating current. Motor cars, however, can be operated just as well with alternating current as with direct.

Another matter which he criticised was that the New York, New Haven & Hartford proposed to operate their suburban service by electric locomotives instead of motor cars. In laying out the new Grand Central Station, the New York Central had arranged to run their multiple unit suburban trains into the station upon a different level from the locomotive trains and it was objected that confusion would arise from a departure from this practice by the New Haven road.

Still another matter to which objection was made was the fact that the New Haven road had not ordered duplicates of the

New York Central apparatus in order that the two roads might pool their equipment.

There were other points in regard to the relative power consumption of the two systems, but in general, as I have already said, the controversy was due to a difference of engineering ideas and a difference of opinion between the gentleman first referred to and the engineers of the New Haven road.

MR. R. H. BLACKALL: I should like to know why the alternating current system is so much cheaper to install and operate after it is installed?

MR. RENSHAW: The principal saving effected by the alternating current system, as I mentioned briefly in presenting the paper, is in the transmission of power to the locomotive. Any electric system can generally be divided into three distinct parts—the locomotives or cars which use the power, the power house which generates the power, and the distributing system which connects these two links together. There is no very great difference at the power house and no great change in economy at the locomotive itself between the direct current and the alternating current systems, but there is a very great difference in the matter of getting the power from the power house to the locomotive. This difference is due to the fact that a much higher voltage can be used for the alternating current system than is possible for the direct current system.

The cost of transmitting electric power depends not so much upon the amount of power transmitted as upon the form in which the power is transmitted. In the same way that it takes a large pipe to carry a given amount of steam power at a low pressure, so in the case of electricity it takes a large rail or wire to distribute a large amount of power at a low voltage. On the other hand, it requires only a small pipe to carry the steam at a high pressure and only a small wire to transmit the electric power at a high voltage. This difference in the difficulty of transmission varies as the square of the voltage, that is, if the voltage is doubled, the cost of the copper conductor will be reduced to one-fourth.

The highest pressure that is at present practicable with direct current is about 750 volts, while with alternating current there is no definite limit. The locomotive described is intended to be operated at 6,600 volts, but it might have been operated at 11,000 volts with but little additional difficulty. Assuming for the sake of ease in figuring that an alternating current locomotive is operated at ten times the pressure at which the direct current locomotive is operated it will be evident that the cost of conductors should be only one-one-hundredth as much for the alternating current locomotives as for the direct current. The cost of the insulators, or supports for holding the conductors, however, increases instead of decreasing with the voltage, but in spite of this the cost of transmission with a high pressure, including all items, is very much less than that with a low pressure.

In order to realize the full importance of the transmission problem, however, another item must be considered. I have been assuming transmission for a given distance. Now, with the direct current system, the cost runs up so rapidly that the distance over which power can be transmitted is limited and stations for supplying that power have to be put comparatively close together. In supplying a long distance direct current line the power supply is obtained by generating alternating current, transmitting it at high voltage and then establishing at short intervals stations in which this alternating current is changed by means of rotary converters into direct current. A direct current line such as the New York Central has, these rotary converter stations about six or seven miles apart.

In the alternating current system, the power can be transmitted a much greater distance than this, so that in general the transforming stations need be put only ten or twenty or more miles apart. The transforming stations in the alternating current system, moreover, are much cheaper than the rotary converter stations in the direct current system because in the latter it is necessary to first reduce the alternating voltage from high to low and then to change the current from alternating into direct and expensive rotating machinery is required to make this last transformation. Such machinery also requires the presence of more or less skilled attendance at all times, whereas, in the alternating current system the transformer stations are of a very simple character, containing no rotating machinery and requiring no attendance.

In general, then, the saving effected by the use of alternating current is due to the economies in the transmission of the power. Much smaller conductors are required on account of the higher voltage employed, a smaller number of transformer stations is required for the same reason, and the equipment of these transformer stations is less expensive than that for corresponding stations in the direct current system.

PRESIDENT: Will you tell us more about the stationary transformer used with the alternating current?

MR. RENSHAW: The stationary transformer used in the alternating current system is similar to an enlargement of the small transformers which you often see mounted on poles or on your houses to supply electric lights. It consists of a number of coils of wire wound around an iron core. The passage of the alternating current around one set of coils produces a magnetic action in the iron and the other set of coils surrounding this iron has a current induced in it by this magnetic action. By changing the ratio of the number of turns in the one set of coils to that in the other set, power can be transformed from a high voltage to a low voltage or vice versa with very little loss.

To transform from alternating current into direct current a machine very much like a generator is required. Alternating current is led into one end of it and direct current is brought out of the other. Such a machine, and in fact any rotating machine, is, of course, more complicated and harder to take care of than a piece of apparatus which is entirely stationary and has no moving parts.

MR. W. J. KNOX: I would like to ask Mr. Renshaw as to the relative efficiency, as they figure it, of the steam engine and electric motor as he has described, that is adding together the per cent of loss at the generator in the power house, the loss in transmission and the per cent of loss at the motor. Is the efficiency of the electric locomotive as great or greater than the steam locomotive?

MR. RENSHAW: I am not very familiar with steam engine efficiencies, but in the electric system the efficiency from the electric side of the generators in the power house to the trolley of the locomotive would be roughly about 70 per cent. or more. The efficiency of the motors on the locomotive is somewhere in the neighborhood of 90 per cent. (Possibly one or two per cent.

less than that) so that from the electric side of the generator to the output of the motor the efficiency is approximately ninety times seventy or 63 per cent.

The efficiency from the engine side of the generators to the electric side is somewhere in the nineties, depending largely on the size of the machines and the proportion of full load at which they are working. It would hardly be less than 92 per cent. with a fair sized machine and might be 96 or 97, so that from the driving part of the engine to the motors on the locomotive the efficiency would be about 95 times 63 or approximately 60 per cent.

With everything considered, there would be, I think, no very great difference in coal consumption between steam and electric service if the steam locomotives were working all the time, but there is a great loss due to the banking of fires and the burning of fuel while the engine is lying idle, during which times you get practically zero efficiency, so that on account of such items we may expect quite a saving in fuel consumption from an electric service.

MR. W. J. KNOX: There is one point in connection with the steam locomotive, as each steam engine is a unit in itself, any misfortune which may happen a locomotive affects only the individual machine, while any derangement of your power plant affects the whole line and puts the entire system out of business for the time being.

Another question I would like to ask. How do you arrange for switching service in congested yards where the traffic must pass without delay from track to track?

MR. RENSHAW: We have not yet installed the single phase system in any place where a great deal of switching has been necessary, but if you noticed the trolley that was shown on the locomotive described you will recollect that it was not like the wheel trolley on a car, but was of an entirely different sort which requires no attention. It simply stays up against the wire. As long as there is a wire over each of the tracks on which the switching is done, and as long as these wires come to a common point, the trolley will pass from one wire over to the other in the same way that the locomotive wheels follow the track.

In regard to the reliability of the service, there are always several units in a power house so that an accident to any one of these units does not shut down the entire power house. The line also is usually divided into sections so that different sections can be cut out of service in case of accident to any one of them. It may be interesting in this connection to note that on the Manhattan Elevated Railroad in New York, which is operated entirely by electricity, only one per cent. of the total delays which occur are due to a failure of the power station or sub-stations.

MR. L. H. TURNER: I would like to know what the probabilities are, supposing that when an engine started out on high speed, or even on freight train on a busy road, and the man in the lead breaks down, what are the probabilities of his fixing up his machine and getting out of the way, in comparison with a man on a steam locomotive?

MR. RENSHAW: It is difficult for us to compare the steam locomotive with the electric locomotive from the standpoint of making repairs on the road since I know very little about the way in which steam locomotives ordinarily break down. From general experience with electric cars, however, I may say that there are comparatively few instances where a damaged car can not be brought to the barn with its own power. I have already called attention to the fact that there are always several motors on a locomotive and that any one or more of these can be cut out of service and the locomotive operated with the remaining ones.

MR. L. H. TURNER: With reduced capacity?

MR. RENSHAW: With reduced capacity, of course. I have known cases of ordinary interurban cars equipped with four motors where the car was run for a week or two at a time with one motor out of service.

MR. H. A. JAGGARD: I would like to inquire why the trolley in the overhead wire is used rather than the third rail?

MR. RENSHAW: The third rail is a feature of electric railways which was forced into use by direct current, that is so large conductors were necessary for conveying the heavy current needed in direct current operations that in order to get a cheap conductor, it was necessary to use a rail rather than a wire, and using such a rail, experience showed that the only practical place to put it was on the ground close to the track. It has been recognized, however, almost everywhere that such rails are undesirable and they are simply used in certain cases because there is no way to avoid them. Aside from the danger of having a live conductor close to the ground where people are apt to come in contact with it, the third rail is a great source of trouble and danger in case of a wreck. A wreck of any kind is likely to bridge over from the third rail to the track and thus entirely destroy the usefulness of the third rail. For instance, if the third rail is connected to the track by means of a broken steel car, then it is impossible for any other car or locomotive to obtain power from that rail until the "short circuit," as the connection is called, is removed.

With a trolley overhead, all of these difficulties disappear. There is no danger of people coming into contact with the wire because they cannot reach it and in case of a wreck, the wire is entirely away from the debris and may still be used as a source of power for bringing relief to the spot. One of the particular advantages of alternating current, therefore, is the fact that it does not necessitate a third rail, but enable a trolley to be used.

MR. STUCKI: There are still a few points, which have not been touched upon as yet.

The distribution of the weight of the present trains is quite uneven. The locomotive by far outweighs the cars per running foot and the bridges have to be built to suit the former. With the electrical equipment, with motor cars as well as electric locomotives, I understand it is more uniformly distributed, which would facilitate matters a great deal in building bridges for a certain given traffic.

Counter balancing the reciprocating parts of a locomotive is a necessary evil. In effect it is not a counter balancing proper, but simply a division of blows and the damaging effect on bridges and the track was very clearly shown in Mr. Cole's paper the other night. In the electric equipment there are no reciprocating details and consequently no disturbing elements of this sort. This will also have a decided influence on the speed limit.

In regard to the starting power it would be to our advantage to use the weight of the engine truck and the tender to increase the adhesion and this is what actually can be done in the electric equipment, and I would be very glad to hear from Mr. Renshaw on these points.

MR. RENSHAW: In regard to the matter of power consumption, it is, of course, well known that stationary engines are more economical than locomotive engines. Moreover, as I have already mentioned, the fuel used up when the locomotive is lying idle is quite an item.

The distribution of weight can usually be made such that the entire weight of an electric locomotive is available for traction. In some cases, such locomotives have been designed with pony trucks so that only 70 per cent. or thereabouts of the total weight was on the driving wheels, but in the majority of cases all the weight can be put on the driving wheels where it is useful for traction.

Counter balancing, of course, is a proposition which does not need to be considered in electric locomotives. The motion obtained is entirely one of rotation and all of the parts are naturally balanced.

One point that I have not previously mentioned is the method of connecting the rotating part of the motors to the driving wheels. In the locomotive which I have just described, one side of each motor rests on the axle and the rotating part is geared to the axle. The other sides of the motor is supported by springs from the truck frame. Under certain conditions it is possible to make motors in which the rotating part is mounted on a hollow shaft and this shaft put concentric with the axle so that the entire weight of the motor can be carried on springs. In such a case, the revolving shaft of the motor is connected directly to the driving wheels through a spring connection at each end. Motors of this type are called gearless motors and in general they can be made only where the service permits moderately high speeds.

Where locomotives are built with gearless motors, the wear on the track should be much less than in the case of steam locomotives, entirely aside from the matter of counter balancing, because all of the weight of the motors is spring supported.

There are so many points of the kind which we have been considering in regard to distribution of weight, coal consumption, counter banancing, wear on the tracks, etc., in which the electric locomotive has the advantage of the steam locomotive that it would require a long time and a good deal of thought to give a complete list. Almost any one of you can doubtless think of one or more items which have not been mentioned. As I have already said, I did not prepare the present paper with the idea of bringing out the advantages of electricity as compared with steam, for I considered that you were already more or less familiar in a general way with a number of these points. My aim, however, was to describe the single phase system which now for the first time makes it really commercially practicable to operate steam railroad service by electric locomotives under general rather than special conditions.

PRESIDENT: This has been a very interesting discussion, but the time is rapidly passing and we will have to bring it to a close.

I regret very much to announce that there has been a death in our ranks, Mr. Edgar S. Lowe, who died on December 6th. It would be in order to appoint a committee on resolutions. I will appoint Mr. D. M. Howe, Mr. R. H. Blackall, and Mr. G. P. Sweeley, as a Committee on Resolutions.

If there is nothing further, a motion to adjourn will be in order.

It was moved and seconded that a vote of thanks be given Mr. Renshaw for his able and interesting article.

Adjourned.

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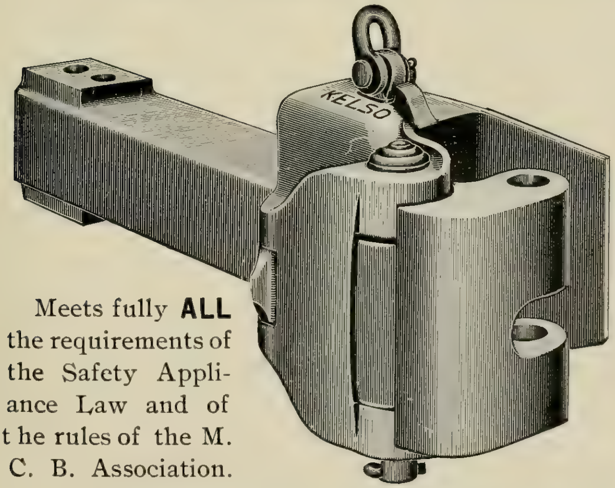

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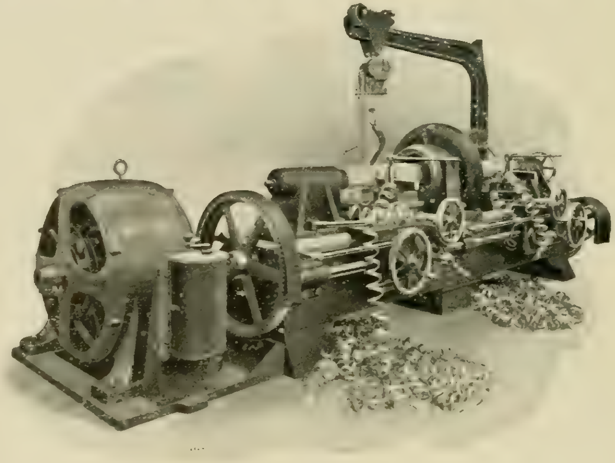

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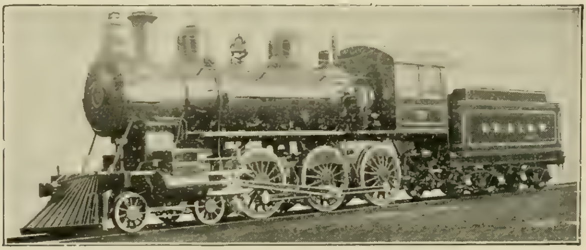

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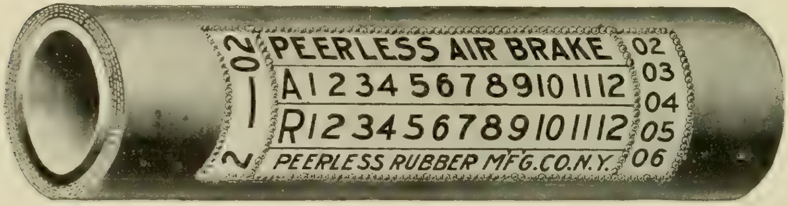
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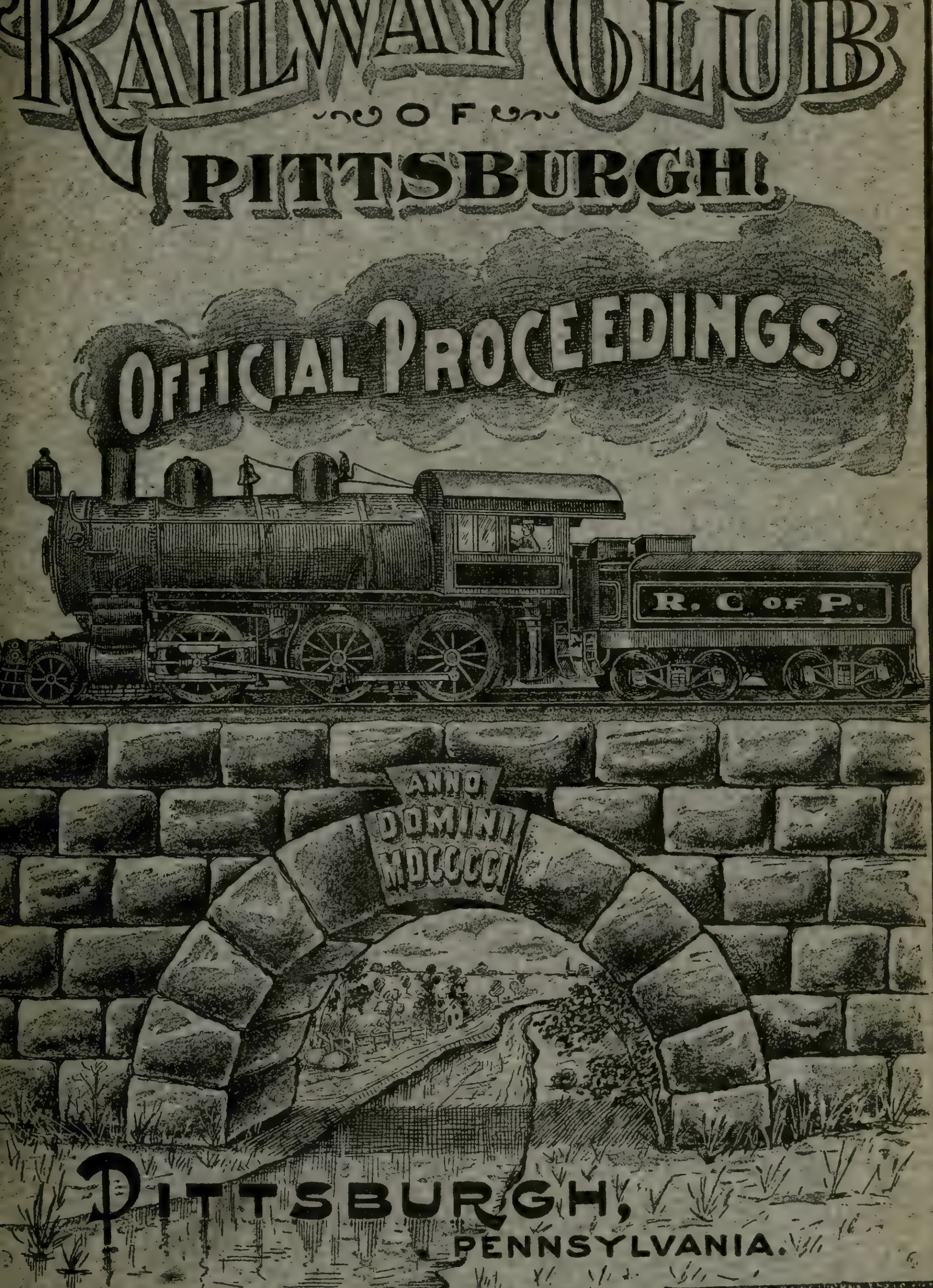

PITTSBURGH,
PENNSYLVANIA.

JANUARY, 1906.

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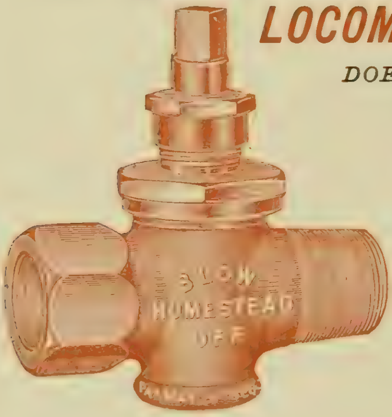

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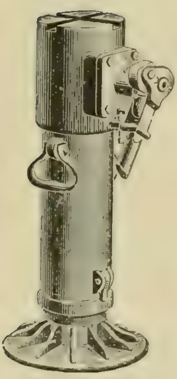
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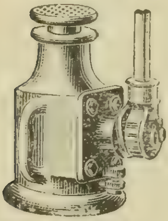
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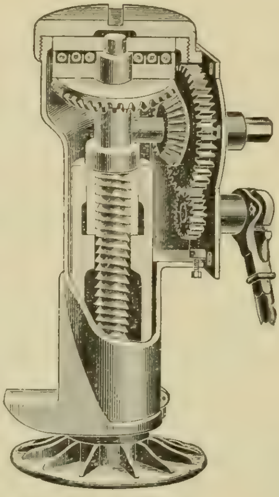
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of the

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Vol. V.
No. 3.
Pittsburgh, Pa., Jan. 26, 1906.
$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

JANUARY 26th, 1906.

The meeting was called to order at 8 o'clock P. M. at the Monongahela House, Pittsburgh, Pa., with President, F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Blest, M. C.
Brand, Thos.
Brown, Geo. P.
Bruner, E. F.
Carson, G. E.
Coates, H. T., Jr.
Conway, J. D.
Coulter, A. F.
Cromwell, S. A.
Curtis, H. C.
Dashiell, J. W.
Duer, B. W.
Dyer, J.
Evans, R.
Gardner, Henry
Gardner, K. C.
Garland, C. W.
George, M. E.
Gray, R.
Grove, E. M.
Gulick, H.
Hamilton, Taber
Haynes, J. E.
Hoffman, N. K.
Horner, H. G.
Huchel, John
Hurd, D. F.
Huyett, E. G.
Jennings, F. R.
Jenny, Jacob
Kennedy, Jas.
Kershner, Robert L.
Kessler, D. D.
Kirk, T. S.
Kissinger, C. F.
Kleine, R. L.
Miller, Geo. W.
Miller, M. M.
Mitchelen, Geo. B.
Mitchell, A. G.
Murphy, W. J.
McAdoo, Jno. H.
McConnell, C. H.
McIlwain, J. D.
McNulty, F. M.
Nickel, J. K.
Orchard, Charles
Platt, A. T.
Porter, H. V.
Powell, F. H.
Quest, F. E.
Quest, W. O.
Ryan, Wm. F.
Redding, D. J.
Smith, D. W.
Spear, H. L.
Stark, F. H.
Searles, E. J.
Severance, F. W.
Scheck, H. G.
Shaw, O. M.
Shaw, W. F.
Slemmer, J. C.
Stoddart, Jas. T.
Stucki, A.
Suckfield, G. A.
Sweeley, G. P.
Tamkins, B. L.
Taylor, H. G.
Terry, W. A.
Tesseyman, J. E.
Thomas, C.

Knight, E. A.
Koch, Felix
Krause, Julius
Lobez, Pierre L.
Long, R. M.
Ludgate, B. A.
Lynn, Samuel
Malloy, M. A.
Melson, Wm. C.
Millar, Clarence W.
Miller, F. L.
Townsend, T. E.
Tucker, J. L.
Turner, L. H.
Wagner, Geo. F.
Walker, Geo. G.
Wells, M. E.
Wood, W. H.
Yohe, J. B.
Warne, J. C.
Watts, H. W.
Weigel, F. S.
Zelch, Jno.

VISITORS.

Alleman, C. W.
Beaumont, H. A.
Belsterling, Chas. S.
Bentley, W. F.
Bihler, L. C.
Bissell, F. B.
Collins, Paul K.
Coulter, H.
Courson, Chas. L.
Drayer, U. D.
Earley, G. G.
Elliott, A. H.
Eichenberger, J. J.
Furlong, H. B.
Griggs, H. B.
Gross, Chas.
Henold, A. E.
Hetherington, S. C.
Hont, C. E.
Johnson, A. J.
Kassler, A.
Kiesel, W. F., Jr.
Lean, Kenneth
Lucas, J. W.
Marquis, E. M.
Minor, H. C.
McKinsey, C. R.
McMurray, G. W.
Ogden, T. A.
Oliver, W. H.
Rasbridge, R. B.
Rauch, T. T.
Riegler, L. J.
Rigney, G. W.
Robb, C. H.
Russum, T. H.
Sanville, Walter F.
Slemmer, G. W.
Squire, Alfred
Tatum, J. J.
Thomas, Jno.
Webb, R. E.
Wilson, W. H.

PRESIDENT: As the minutes of the last meeting are in the hands of the printer, if there are no objections, they will stand approved as printed.

PRESIDENT: Mr. Secretary, have you any proposals this evening?

SECRETARY: Gentlemen, we have the following proposals to present this evening:

NEW MEMBERS.

Bihler, L. C., Traffic Mgr., Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

Davis, M. J., Asst. M. M., P. R. R. Co., 413 10th St., Altoona, Pa.

Evans, Samuel R., Yard Master, P. & L. E. R. R., Newell, Fayette Co., Pa.

Groobey, Geo. Rep., Buckeye Steel Casting Co., Columbus, O.

Hill, M. H., Foreman, Pressed Steel Car Co., McKees Rocks, Pa.

Murdoch, Harry, Pres., H. Murdoch & Co., Fitzsimmons Bldg., Pittsburgh, Pa.

McGaughey, C. L., Asst. Train Master, Monon. Div. P. R. R. Co., S. S., Pittsburgh, Pa.

Sanville, Walter F., Rep., Doubleday Hill Elect. Co., 919 Liberty St., Pittsburgh, Pa.

Schuchman, W. R., Secy., Homestead Valve Mfg. Co., Homestead, Pa.

Stelle, C. A., C. E., Inspector, B. & O. R. R. Co., 117 S. St. Clair St., Painesville, O.

Wharton, Wm. M. Jr., C. E., P. C. C. & St. L. Ry., 1113 Union Sta., Pittsburgh, Pa.

Wilson, Geo. A., Pres., Geo A Wilson & Co., Keystone Bldg., Pittsburgh, Pa.

Worthington, B. A., V. P. & G. M., Wabash-Pittsburgh Ter. Ry., Wabash Bldg., Pittsburgh, Pa.

Phelps, W. H., Jr., Clerk, P. R. R. Union Line, Box 204, Coraopolis, Pa.

Johnson, A. J., Supt., B., R. & P. Ry. Co., DuBois, Pa.

Wilson, W. H., Supt. M. P., B., R. & P. Ry. Co., DuBois, Pa.

Courson, Chas. L., Asst. Fore. Car Inspectors, P. R. R. Co., Pitcairn, Pa.

PRESIDENT: These applicants will become members as soon as they are approved by the Executive Committee.

PRESIDENT: Mr. Secretary, have you any communications to present at this time?

SECRETARY: I have a letter here. It is a matter that has already been acted upon.

The Master Car Builders' Association.

Chicago, Ill., January 23rd, 1906.

Mr. J. D. Conway, Sec'y.,
Pittsburgh Railway Club,
Pittsburgh, Pa.

Dear Sir:—The Arbitration Committee of this Association will meet the last of April or early in May to prepare its report on the revision of the Rules of Interchange, to be presented to the convention in June. If you can find it convenient to set apart a part of one of your monthly meetings for a discussion of what changes your members feel necessary should be made in the Rules of Interchange and advise me promptly of the results of the discussion, I will place them before the Arbitration Committee for its consideration, when it meets to make up its report. Your recommendations should be in this office immediately after your April meeting.

Yours truly,
JOS. W. TAYLOR,
Secretary.

PRESIDENT: We have for a subject this evening one that is of wide interest both to the railroads and the shippers, and I must confess I am a little disappointed in the manner in which the author has presented the matter. But, no doubt he has some further ammunition up his sleeve, and the meeting will become very interesting. We hope everyone will feel at liberty to take a hand in this, in order that the rules may be better understood by all concerned.

It gives me pleasure to introduce to you Mr. Kirk, who will now take charge of the meeting.

MR. T. S. KIRK: Preliminary to reading my article, I wish to explain and excuse myself for perpetrating it upon you. Mr. Stark wrote asking me to write an article on the subject of loading long material. I at first declined for the reason that, having been a member of a committee that revised the rules, I felt that to take a step in contravention of those rules was to criticise my own action. Upon his insistence, I finally agreed to write the article, but reserved the right to furnish it on lines that I felt to be consistent and on no other.

I shall give a history of the necessities for providing means for the transportation of long material, and leave it to you, gentlemen, to take the rules and deal with them as it suits your convenience.

My first impulse was to commit (memorize) my article, but on second thought concluded not to do so. Having reached my present age without having committed a nuisance, I concluded I would refrain from doing so in this instance.

With your indulgence, I shall now read my paper.

In Relation to Loading Long Structural Material.

BY T. S. KIRK, SHIPPER, JONES & LAUGHLIN STEEL COMPANY.

Mr. President and Gentlemen:

This subject has been assigned to me and it is expected of me, that I shall, by going back through the portals of memory, resurrect from the Catacombs, long forgotten experiences and by the Alchemists' Art weave them into a web with the present, without a break in the blending.

Whilst I question the wisdom of the choice of the Historian, it is not for me to say that the selection was not prompted by motives of expectation.

Having been engaged in the forwarding business, since when the mind of man goeth not to the contrary, it is but natural that those who associate achievement and experience in one line should fail to reason that possibly in all others we are deficient.

I shall endeavor to make this article reminiscent, rather than confine myself to suggestions along the lines of iconoclastic conjecture.

In order that we may see the paths through which our devious way has led, we will take up the early years, when Iron was King, leading on up through the almost forgotten past ,coupling the mediaeval with the present. Looking backward in the abyss of time, we see the rolling mill, primitive and non-progressive. In the absence of mechanical appliances, all operations were conducted by the power of labor alone; there was no effort put forth in the direction of economizing by the introduction of mechanical adjuncts. Heating furnaces were small; the weight of the bloom or faggot was confined to what men could handle; at the rolls the same conditions governed. In consequence of these primitive methods it was impossible to produce bars whose length exceeded thirty feet.

I am speaking now of the period covered between A. D. 1860 to 1880—eventful years. The first period representing the birth, the second the adult period of the iron industry. When man has reached his full bloom vigor, his energies at once begin to wane; so it is with all things in nature; so it was with the iron industry. At the time I speak of, Braddock's Fields had not been invaded and its peaceful slumbers broken by the noise of the exhaust steam and the rumbling of ponderous machinery, afterwards known as the Edgar Thomson Steel Works.

Across the river where now the Homestead Steel Works casts its black clouds over the landscape, peacefully nestled amid its rural surroundings, the County Poor Farm. Strange that where once was the home of poverty is now one of the greatest wealth producers in the world.

As I remember, there were but two private dwellings in what is now the flourishing city of Homestead. One was occupied by a German named Fleishman, the other by an Irishman named Young.

In those days, for the reasons given in the foregoing, there were no long lengths produced by our rolling mills, and consequently there was no need for extraordinary means for transportation.

Civilization must either progress or retrograde. Nature in its physical and social environment knows no calms. Energy is life, rest is death.

The Iron Master of the past, with few exceptions, was a self-satisfied lackadaisical creature; having advanced from a workman to the degree of Master, he felt satisfied.

Along about this time, the new steel process, discovered by Dr. Bessemer, was introduced—first by the Cambria Iron Company, located at Johnstown, Pa. Under the guiding and developing hand of that greatest of all captains of industry, William Jones, this process was perfected, and began to raise its head and beckon to enterprising men to carry it forward. With its development came the writing on the wall that meant the doom of the Iron Age; it came as an irresistible wave, sweeping everything before it. With its ascendency came the necessity for new mechanical devices, whereby ingots weighing six thousand pounds or more could be manipulated and reduced economically into merchantable products.

Engineering Science, progressing along the lines of utility, was not laggard in grasping the future possibilities. The engineer had long since hoped for the dawn to break, that would enable him to span the chasm of wide openings, by the use of unspliced members; with the development of the Bessemer process his hopes had been realized.

Bridges and viaducts were projected on a grander and more elaborate scale than heretofore, and in their construction long members were specified. Now for the first time it became a question in the mind of the shipper as to the ways and means for transportation.

Our car loads usually comprised short and long materials (the engineer having guardedly refrained from going to the extreme in specifying long members), most of the material therefore being in lengths within the limit of one car, we loaded about equally in the two cars. In such cases, the short material being equally distributed, we placed blocks (usually discarded cross ties) on which we rested the long sections. To prevent lateral movement, railroad spikes were driven close against the bars.

For your better understanding, I would say drop-end gondolas were exclusively used, and as their capacity was but 30,000 pounds, top-heavy loading was impossible.

We heard no complaints of cars upsetting, and shifted lading, a source of modern complaint, was unheard of. Those were halcyon days for the shipper.

As time wore on, larger cars of greater capacity came on the scene, heavier and more powerful engines were employed, and I think a more reckless class of men formed the crews.

These, with the increasing demand for long structural shapes, brought us face to face with the promblem of designing entire car loads of superimposed material. Cross ties had to be relegated to the past; railroad spikes were supplemented by heavy stanchion.

In the absence of any counsellor we struggled along, using our judgment, keeping ever present the one all-engrossing desire—safety for life and security for property.

By and by, after we had mastered the situation, came to us a book of rules, formulated from theoretical generalities, which we found it impossible to sedulously follow.

We were, therefore, compelled to cast it aside, and to continue along the practical lines which our experience had taught us not to be far wrong.

One of the greatest objections we found with these rules was the tendency to increase our costs in preparation, until the profit on the material to be forwarded was practically absorbed. With this we took issue, knowing that the rules were recommended and were not mandatory. We also well knew that the rules were then, as they are to-day, local, rather than general, in their operation.

They were then, as they are to-day, subject to whatever construction might be placed upon them by the Inspector. Where competent men are employed, we experience no annoyance. It is the incompetent man we most fear. I think these rules call for greater amplification. Not to clear the atmosphere for the competent inspector, but to make it necessary that the incompetent one shall exercise that which he does not possess—reason.

While I write I have before me Books of Rules recently published and distributed by the Pennsylvania, the Pittsburgh & Lake Erie and the Baltimore & Ohio Railroads. They each embody modern suggestions, and, so far as my judgment extends, I think their exactions are mostly confined within practical lines and should not be tampered with, except, as I said before, by amplification.

On our side, I wish to say, we have no desire to economize at the expense of life and the security of property in preparing cars for transporting material. Our hope for restitution lies in the desire that some day the railroads may see the justice in assuming part of our cost in fitting up their cars for their benefit as well as ours. I suppose we cannot look for this generous impulse to impel them at once; they have been too long accustomed to all the fruit to be satisfied at this time to cast the pit.

Some friends have requested that I embody in this paper reference to three subjects, in which I concur, in believing it to be the duty of the Master Car Builders' Association to look into. I shall present them in their natural sequence:

FIRST—Overhanging loads. We think so long as we confine the height of the projecting ends in overhangs to the prescribed limits above the rail, we shouldn't be restricted to any height of car.

SECOND—Loading on the floor of the car. We think we should be permitted to load over either of the idle trucks at least one-fourth of the capacity of the car, in addition to the weight of the superimposed load. As we view it, the floor load acting as ballast would steady the car and at the same time would lower the center of gravity and would in no way impair the safety of the load. Appealing to the cupidity of the railroad, we wish to impress, that by increasing in this way they favor the shipper and without doubt would increase their own revenue.

THIRD—The necessity for classifying. I am informed the B., R. & P., driven thence by the Philadelphia & Reading Railroad, construe angles and channel sections as flexible material, and insist that the rules governing in the loading of ribbon-like plates shall govern in these sections also. It is my opinion this is a field where our local Solons associated with the Master Car Builders' Association should do a little missionary work among the benighted heathen, who, amid the sylvian glades, hear of few things new, except when visited by nightmare, the result of overindulgence at some church festival or wayside hostelry.

You will observe I have discanted but little on the subject in hand, and I may here say, designedly. The present rules for loading were trimmed and pruned, after a conference held, where the railroad and the manufacturing interests were represented. We measured our lances and parted, satisfied with the concessions each had gotten. To tear down the structure after having participated in the upbuilding would be to open the way to expurgate everything and begin it all over again.

I am convinced that in formulating the present rules the Master Car Builder's Association was actuated by the best of motives, and, being intelligent men, threw selfishness aside and looked the subject squarely in the face. If they will but extend their explanations so that nothing shall remain concealed, even to the most obtuse inspector or loader, they will have bestowed a boon on we poor mortals that will be appreciated.

Aside from any consideration of the subject in hand, being altogether extraneous and yet intimately blended, I wish to speak of one matter that is a serious source of annoyance and a menace to the shipper. I refer to the restrictions placed on the character of cars going into New England over the N. Y., N. H. & H. R. R. Owing to their bridges and tunnels having been built a long time ago, the modern standard car has been embargoed.

We are obliged to use the class of car that is fast disappearing from use. Cars that are being supplemented by new ones more in harmony with present needs.

Unless the controlling interests of this splendid aggregation awake to the onward march of enterprise, they will some day, and that not a far distant one, find themselves confined to strictly local traffic.

PRESIDENT: I know no one who is better fitted to open the discussion than Mr. L. H. Turner, Superintendent of Motive Power of the P. & L. E., who has been an active member of the Master Car Builders' Standing Committee on loading long materials. We will ask Mr. Turner to open the discussion.

MR. L. H. TURNER: Mr. President, Mr. Kirk, as a representative of the shippers, has very ably presented to you their requirements, to all of which the railroads are duty bound to give proper recognition, keeping in mind the fact, however, that they are also duty bound to most carefully guard the safety of the traveling public and train men, by not attempting to transport commodities improperly loaded or secured. And while it is not believed for a moment that any shippers would knowingly permit a car to leave their sidings improperly secured, at the same time their responsibility ceases at the moment the railroad company accept the car, and places the moral and financial obligation upon the railroad.

It is an undisputed fact that the railroad has but one commodity to sell, and that is transportation; and it must be conceded that the purchaser of this commodity has a right to say what kind of transportation shall be given him, provided he does not want such as will jeopardize the safety and welfare of others, and for this reason the Master Car Builders' Association has a committee to determine as accurately as possible just what is necessary to be done in the way of securing loads of long material that will make the costs as low to the shipper as is consistent with safety.

As has been related by Mr. Kirk, the growth of the production of this type of material, and the introduction of larger and heavier capacity cars, has brought about new conditions. And while it is unquestioned that every man who has given opinions upon the subject was honest in his convictions, and probably supported by accurate mathematical deductions, at the same time it must be confessed that loading carried out on theoretical lines has been found to be more stringent than actual practice has proven to be necessary.

At the last convention of the Master Car Builders' Association the Committee on Rules for Loading Long Material was continued, in order that they might make further investigation and finally arrive at some understanding which would prove satisfactory to all railroads and shippers.

Rule 15-C seems to be the one that is hardest to agree upon, and loading under this rule is shown upon figure 1. Loads are being sent out of this district as shown on sketch measuring 11′ 4 1-2″ from rail to center of load. This height is never reached except when cars with top sides 4′ 5″ high are used, and while height to center of load is 25 1-2″ inches higher than is allowed on one of the leading roads, no accident has occurred, notwithstanding loads of this height are quite common.

It will be observed that the sketch shows lines over the idle truck, representing a load of short pieces equal to one-half of the marked capacity of the car. With this additional load of short pieces, the center line of gravity is 7′ 2″ above the rail; without this load the line of gravity is raised to 7′

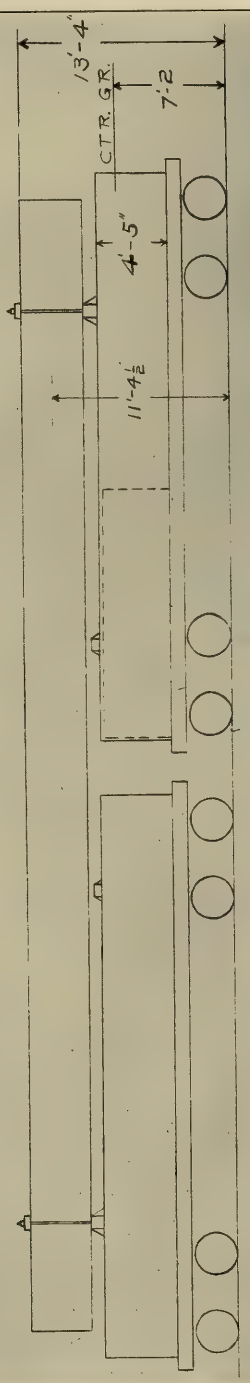


FIG-1

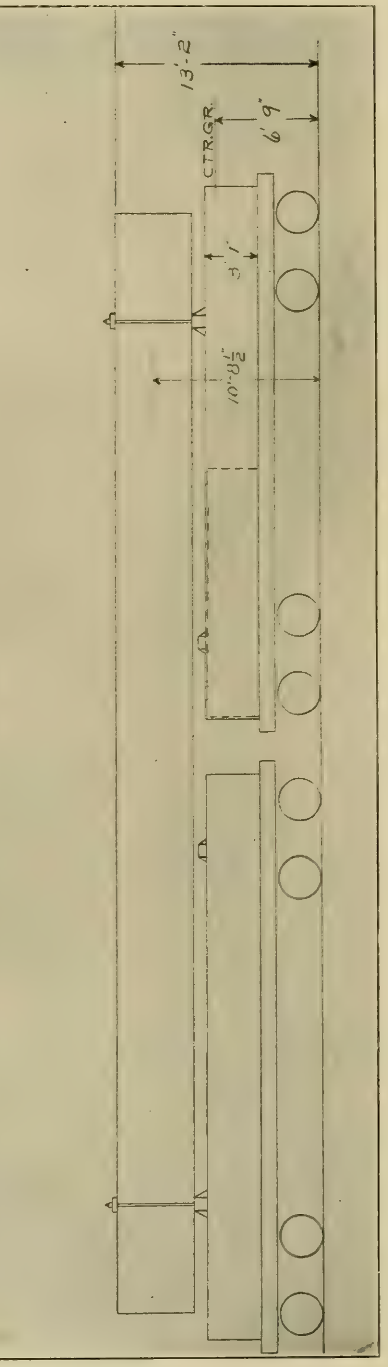


FIG-2

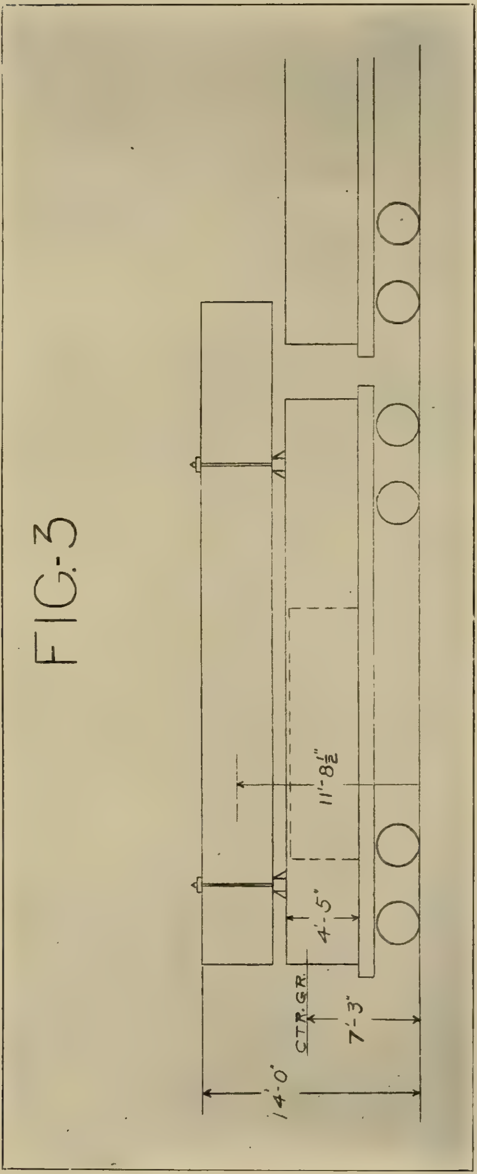


FIG-3

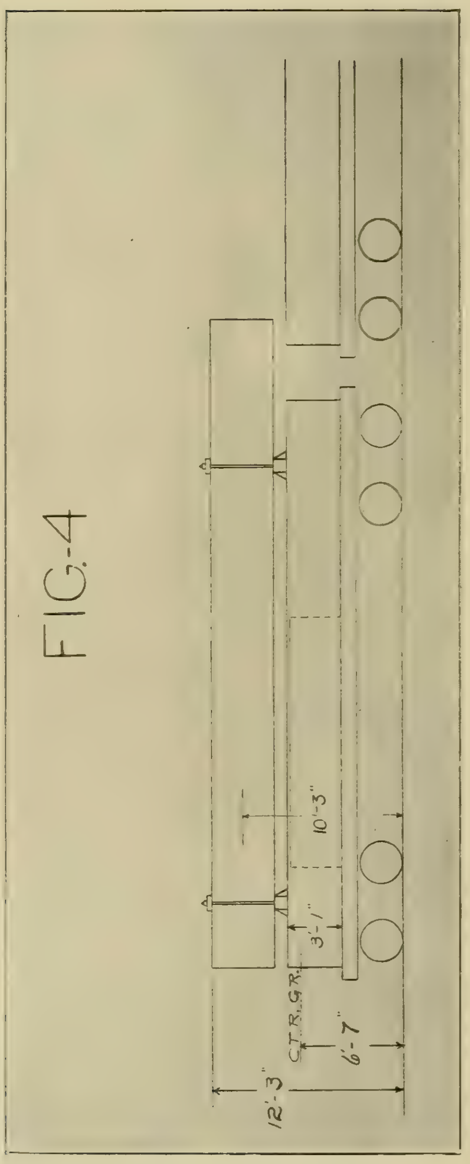
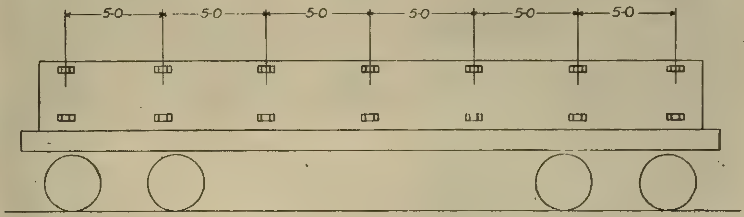


FIG-4

FIG.-5

AUXILIARY STAKE POCKETS TO BE PLACED ON OUTSIDE OF
BOX WHEN WIDTH OVER POCKETS WILL NOT EXCEED
CLEARANCE LIMITS-OTHERWISE TO BE PLACED ON INSIDE.

CARS UNDER 33'-LONG INSIDE TO HAVE 5 STAKES ON A SIDE
" OVER " " " " " " 7 " " " " "



6 1-2″ above the rail, showing that this additional loading is advantageous in giving you a safer load. It also gives the car greater earning capacity.

Figure 2 shows car with top side 37″ high. Height of center of load 10′ 8 1-2″. Total height, 13′ 2″.

Figure 3 shows projecting top load, total height 14′ and 11′ 8 1-2″ to center of load, with short material on bottom of car, sufficient in amount to give each truck half of the capacity of the car.

Figure 4, showing same method of loading, with lower top side and corresponding reduction in total height.

While the output of long structural material has increased to a very great degree within the past few years, the railroads as a whole have not made especial provision for its movement; and while it may appear to some that a top load should be kept down within theoretical limits, it is a fact nevertheless that cars are being loaded daily of the heights shown on these sketches and taken to destination safely with the usual train movement. Rule 15-C as it now reads has practically been in effect for years, and not a single accident has occurred to any loading of this nature taken out of the Pittsburgh district over the Pittsburgh & Lake Erie R. R. and delivered to the Erie or Lake Shore Roads. With this fact before us, it seems to me that we should continue to give the shippers the best equipment we have and not stand on theoretical deductions when actual practice has proven them to be wrong.

Figure 5 shows an arrangement for auxiliary stake pockets, which seemingly are best arranged for loading pipe and lumber. Officials of the National Tube Works endorse this arrangement, after having made numerous tests, and any practical man will say that it is entirely suitable for lumber.

The M. C. B. Committee on this work will appreciate an expression from this Club on the subject before us tonight, and before the meeting closes a resolution will be offered asking your endorsement of Rule 15-C as it now reads, also the arrangement of auxiliary stake pockets as shown in figure 5.

PRESIDENT: The meeting is now open, and we hope you will take advantage of all the time. We shall be glad to hear from both the shippers and the railroad men.

MR. C. ORCHARD: As Shipper of the Carnegie Steel Company at Homestead Steel Works, I have a few remarks to make on the paper just read. After Mr. Kirk's introductory remarks, I do not think it will be necessary for me to say anything in that particular line.

OVERHANGING LOADS.

For the benefit of those present who are not conversant with the points proposed for discussion, it might be well to define what is meant by an overhanging load. Any material, such as plates and shapes, too long to be loaded in a gondola car can be transported on a single car of that kind by supporting one end so as to bring it above and allow it to project beyond the end of the car. The part between the support and the outer end is known as the overhang, and is regulated as to dimensions by M. C .B. Rules. When the overhang projects beyond the end sill, it is protected by a second car, which may be either loaded or empty.

The presentation of this particular style of load for discussion was prompted by a recent ruling made by one of the railroads in this district, under which a limit was placed on the height of the sides of cars used, which action, it is claimed, is in accord with M. C. B. Rules. This contention, I think, is incorrect, as the only limit on overhanging loads in M. C. B. Rules refers to the width of the load, length and position of the overhang, and the general restriction (Rule 8) on the weight loaded on one truck. I feel sure that the M. C. B. Committee on Loading Long Material gave full consideration to the question of high side cars used for overhanging loads, and very sensibly left the matter to the good judgment of the shipper, who, of course, is governed by the kind and condition of the car, the nature of the material, and the clearance limits of the road over which the lading is to travel.

While the absence of positive restrictions are at times of advantage to shipper, at the same time I think that load limits for overhangs of various lengths should be incorporated in the M. C. B. Rules for the guidance of the loaders, and would suggest in this direction a limit of capacity of car on overhangs up to 5′, three-quarter capacity up to 10′, and one-half capacity between 10′ and 18′, which I am sure will make a perfectly safe load.

LOADING ON THE FLOOR OF THE CAR.

Many of the orders received from buyers of structural and plate steel cover both long and short lengths; that is, pieces from 50 to 100 feet or over in length requiring two or three cars for their transportation, and lengths which can be loaded in a single car. Very often the total order does not amount in weight to but little more than the minimum of 45,000 lbs. prescribed by the official classification for material requiring two cars. In cases of this kind it is necessary to ship the long and short lengths on the same cars in order to save freight charges. This is done by loading the short lengths on the floor, and the long pieces on blocking placed on the tops of the sides. Long plates, on account of their being flexible, when loaded on two cars, require an average of about three cross blocks on each car, while long structural shapes may be safely carried on one or two blocks on each car. The M. C. B. Rules, however, do not authorize loading of any short material under long lengths unless the long lengths require the use of three blocks on each car (15-F), and under a strict interpretation of these rules a large number of our shipments are liable to be held up. For the protection of shippers against the act of some inspector who might be guided by the rules as they read, I think it would be well to make specific reference in M. C. B. Rules to short material under loads carried on one or two bearing pieces on each car. If the top load does not exceed one-half marked capacity, an additional floor load of at least one-quarter capacity should be authorized, regardless of the number of blocks necessary to carry the top load. This would lower the center of gravity and tend to make a safer load.

In shipping material of this kind we are governed by common sense rules, and always endeavor to make the load safe by carefully proportioning the top and bottom parts at the same time giving due attention to the kind and condition of the cars used.

FLEXIBLE MATERIAL.

The third subject mentioned by Mr. Kirk, under the heading of "The Necessity for Classifying," is by far the most important, and calls for the attention due a real grievance. The ruling which was primarily responsible for the introduction of this subject applied to a shipment of 12" channels, 60 to 65 feet long, loaded on two bearing blocks and two slider blocks on the floors of two 85,000 lbs. capacity gondolas. The weight of the load was 116,600 lbs. The cars were in first-class condition, and under rule 15-B could have been loaded up to three-quarter capacity, or 127,500 lbs. It was claimed that the load should have been limited to one-half capacity according to rule 15-D, for the reason that the material was flexible, and should be classified in the same category with long plates. I state this case in detail, as this ruling was made to cover all shipments of long structural shapes shipped via the road concerned. I do not know what consideration prompted this action. If it was a question of safety, I hardly think it was warranted, as everyone familiar with the handling of long shapes of the heavier sections knows that they are not in any degree flexible in the sense that long plates are, and that very few accidents are directly due to shipments of long shapes when loaded within the limits prescribed in M. C. B. Rules. The effects of this classification, however, are far reaching, and bear upon both shipper and carrier. On the part of the shipper it means the handling of a larger number of cars in crowded yards, and on loading tracks of limited capacity additional loading cost, delay in shipping, and in many cases an increase of at least 50 per cent in blocking cost. To the railroad, the furnishing of 50 per cent more cars, which will be necessary with reduced load limit, will be a matter of serious importance, particularly during periods of car shortage. On the tonnage handled it means an increase in operating cost, and a corresponding decrease in net earnings.

I am very sure that a heart to heart talk between certain traffic and transportation officials would result in some action regarding the ruling in question of advantage to all concerned.

SAFETY IN LOADING.

Absolute safety through the elimination of accidents due to material shifting, cars breaking down, etc., can be attained only by the carriers declining to handle freight of any description. In these days of air-brakes, and fast movement, long trains, large cars, and high power engines, only a reasonable degree of safety can be either expected or secured.

The M. C. B. Rules on loading long material, as they now stand, were compiled after a great deal of thought by men thoroughly familiar with the transportation of structural steel, and after repeated consultation with those experienced in its loading, and as a joint product, are as nearly complete, on the whole, as can be devised. So far as the shippers are concerned, I am sure that an honest attempt is being made to live up to the rules in every particular. No matter how thoroughly the work is done, mishaps due to rough handling in yard shifting, and to other causes beyond shippers' control, will occur which should not be made the ground for sudden and burdensome restrictions. Safety is the watchword of the shipper as well as of the carrier, and not infrequently the requirements of the M. C. B. Rules are exceeded in order to contribute toward it.

During periods of extreme car shortage cars are furnished, and of necessity accepted and loaded, which long ago should have been relegated to the scrap heap. Equipping these cars requires an expenditure of material and labor not contemplated by the M. C. B. Rules, and is the shipper's extra contribution toward getting the tonnage away.

The discussion of these points was not prompted, I am sure, by any spirit of fault finding toward the M. C. B. Rules, but rather with the idea of securing a free interchange of views between practical men, so that the "benighted heathen" might be induced to "stop, look, listen," and to act accordingly.

MR. W. H. WILSON: This paper has been of particular interest to me from the fact that I am identified with the first railway company mentioned by Mr. Kirk in the third section of his paper.

I am glad to have an opportunity to present to the Railway Club of Pittsburgh the position that the Buffalo, Rochester and Pittsburgh Railway Company occupies in relation to the three subjects mentioned by Mr. Kirk. I will take them up in sequence.

First, Overhanging Loads: On October 24, 1905, my company issued Special Notice No. 10, limiting the height of the sides of cars on which long material could be loaded to 40 inches. On January 4. 1906, an order was issued cancelling Special Notice No. 10 of October 24, 1905.

The B., R. & P. Ry. do not, therefore, restrict the height of the sides of cars on which long material can be loaded, if in accordance with the M. C. B. Rules, revised in June, 1905.

Second, Loading on the Floors of Cars: We will receive cars loaded with short material on the floors of cars having long material on the top and sides, in accordance with Rule No. 97.

Third, The Necessity for Classifying: It is a fact that long angles, channels, beams, etc., of small section, were classified as flexible material. I have not determined the reason for this practice. but early in January, 1906, all of our inspectors were instructed to receive such loading in accordance with the rules, and to classify long angles, channels, beams, etc., as rigid material.

By this it is shown that the B., R. & P. Ry. Co. will accept for movement over its line any freight that is loaded in accordance with M. C. B. Rules revised in June, 1905.

The management of the B., R. & P. Ry. Co. are anxious to interpret the rules for loading long materials as liberally as is consistent with safety to property and to persons.

SECRETARY: It seems to be in order for each of the roads touched by Mr. Kirk in his paper to get under the wire, so that we have here a message dated New Haven, Conn., January 26:

"I have just seen advance copy of Mr. T. S. Kirk's paper. The N. Y., N. H. & H. R. R. is now spending a large sum of money to increase clearance sections, and by the next 12 or 18 months will bring about a great improvement in that respect. This road will soon be in a position to handle modern standard cars so far as clearances are concerned. Wish to have this read in answer to the last part of Mr. Kirk's paper.

(Signed) "S. HIGGINS, Genl. Manager."

THE CHAIRMAN: We would like to hear from Mr. Rasbridge, of the P. & R., and then all the roads would be represented.

MR. R. B. RASBRIDGE: Mr. President and Gentlemen: I thank you for the courtesy extended, and in reference to the paper just read, my feelings can best be described by a story I will relate:

"Among the passengers in a chair car was a lady who was very much interested in a book she was reading. Presently she removed her shoes and resumed reading. A little later she removed her stockings, which naturally attracted the attention of two gentlemen, who were at a loss to understand this peculiar action. Imagining the lady was ill, one of the gentlemen, after proper apology, volunteered his service, and was informed she was not ill and asked what made him think so. With permission he related her peculiar actions. The lady smiled and in reply said: 'If you knew the book I was reading, you would not be surprised at my actions. I am reading a book called "Sapho," have you read it?' Receiving a negative reply, he was advised to read it, and informed while reading it she became so hot she had to turn the hose on herself."

This, gentlemen, was my feelings on reading the paper now before the meeting, and if I get too hot, Mr. President, I will kindly ask that you turn the hose on me. Were I a member of your Association I would have the same privilege as the gentlemen presenting the paper, and must confess, as a representative of the Philadelphia & Reading Railway Company, take issue or cross swords with him. It should be understood, I wish to respect the feelings of the gentleman, no disrespect intended and direct sarcasm will be avoided, yet I ask and am entitled to your sympathy as I am supposed to be one of the benighted heathen from among the Sylvian Glades.

The third clause is what I particularly refer to. I am pleased to note his opinion is based on hearsay. This alone is the only truthful statement contained in this clause, the balance I most emphatically deny and wish to emphasize it. The most surprising part in the language of the author is the directness of the charge, which we would not expect from one who considers his achievements and experience sufficient to place him on a high pedestal of worth and merit. To the contrary, it appears as if this is not a resurrection of long forgotten experiences from the Catacombs, but the mind of man who has reached his full bloom and usefulness, and his energies are waning.

I wish to emphasize the fact that so far as the P. & R. is concerned, this charge or assumption is without foundation. From a point of law, the author could be held responsible, but we will be more generous and waive this as he has certainly been misinformed. I do not know where he got his information, it did not come from us.

We have no connection for the receipt or delivery of cars with the B. R. & P. This has come about, no doubt, owing to the fact that we were receiving from the N. Y. C. shipments originating in Pittsburgh and delivered to the N. Y. C. by the B. R. & P. with loads of what is commonly called kick-up or overhanging load, which the M. C. B. rules limit to an overhang of 18 feet at a width of 8 feet one inch. These loads ran anywhere from 20 to 23 feet overhang, and exceeded the height allowed over 12 feet. When you deduct two inches in width for every foot in height over 12 feet. Our Chief Join Inspector accepted the loads. I was called in to see others later on, after we had several derailments. I measured the loads carefully, giving them careful consideration and accepted them with the understanding that we would only move them on slow-speed trains. Notwithstanding, that we took all the percautionary measures we could, we had three derailments which resulted in considerable damage to property.

On the strength of this I visited Newberry Junction and took the matter up in connection with the N. Y. C. and our Chief Joint Inspector, and arranged to have the loads adjusted to the proper overhang, proper width and to avoid the overloading of the truck under the overhanging end which was exceeded to the extent of 20 to 30,000 lbs. in some cases. You realize just what this means. At that time the 1904 rules were in force. We issued an order to our Chief Joint Inspector that we would refuse to accept loads that did not conform to the rules in regard to width, overhang and weight on trucks, stating what trouble we had and our reasons for doing so.

After the 1905 rules took effect, and there was no limit placed on height of car, the N. Y. C. asked us, since there had been no limit placed as to height of side of car, whether we still held to the 1904 rules which limited the height of car side, saying the B. R. & P. requested this information. Our reply was that we would accept any load which was in accordance with the present rules and that was considered safe, based on good horse sense and judgment. It is not our intention to turn down the committee, or the M. C. B. rules, neither do I think it is the intention of this Association. We have got a criticism here, not only one, but a great many. We know these rules have not been formulated hastily, they are not of mushroom origin; they have not sprung up in a night, and they have been given very careful thought. Some of the best minds in the country we might say have been on these committees, and the services of those that were not on the committee have been enlisted, their ideas were asked for, their opinions were freely given on the subject, and the whole aim was the safety of the load, the protection to the shipper and the railroad company.

In regard to this matter I do not say that these rules are perfect as laid down in all respect, I believe they can be improved and modified to a great extent, and believe shippers should be given more consideration, and think sometimes the M. C. B. Association has made a mistake in not consulting the shippers, or having a representative on that committee or probably at their meetings, the same as we had some years ago when we done away with the crib bolster and adopted Figures 54 and 55. We had representatives from the principal structural departments in the country, in fact Mr. Major who was President of the American Bridge Company later, was Chairman of that Committee, and the shippers were well pleased with the results obtained, which afterwards was incorporated in the rules.

Further criticism, although a great temptation, will not be of any benefit, and in the language of the writer to which I have confined myself closely, we alone must consider safety for life and security of property. Gentlemen I thank you.

MR. T. S. KIRK: I am sorry that the shafts leveled at the P. & R. have taken such a deep significance; but since what I have said has been corroborated by Mr. Bihler and Mr. Orchard, it would appear I have not been altogether misinformed—I wish to say most emphatically therefore, (if I have said anything I am sorry for—I am glad of it,) It has at least called attention to a fault which we hope and believe will bring forth a remedy. It was not to score the P. & R. and B., R. & P. that we mention their short-comings but to give them a chance to correct the evil.

PRESIDENT: This is the golden opportunity for the shippers to make known their grievances, if they have them, real or imaginary, and also for the railroads to make complaints of the manner in which the loading is done. I hope you will feel free to continue this discussion.

MR. L. C. BIHLER: Mr. President and Gentlemen: I want to say on behalf of the shippers that I do not think they have any real grievances. About all they need is greater amplification of the rules that Mr. Kirk refers to in his paper. They do not have any trouble with the Inspectors of the initial lines; we know the M. C. B. representatives of the initial lines and get along with them. When there have been any differences, they have been harmonized; but it is the Inspector of the connecting lines who is taking the rules as his bible, and goes on the pretext that what is not printed is not authorized, and that if it is not authorized, he cannot accept it. Therefore, we think the M. C. B. rules ought to be amplified, specifying what is or what is not flexible, in other words, to distinctly state that angle beams, channels, etc., are not flexible material in the sense that ribbon like plates are. There should also be a rule for the benefit of the Inspector at connecting points, permitting him to accept short pieces in the box of cars of a superimposed load.

The figure on the paper of the overhang load is not common. The more common overhang load is the one where the greater portion of the load is down in the box of the car. If I had known there were going to be illustrations shown here, I would have sent the Secretary photographs, and sketches could have been made. But I think Mr. Turner has in mind the kind I speak of. The overhang is only visible at one end, the greater part is in the box of the car.

In regard to the remarks of the representative of the P. & R. Railroad, as far as our information goes to-day, we are not permitted to ship via the P. & R., any superimposed loads where the sides of the car are higher than 40 inches. The B. R. & P. who have come into line did not wait for this meeting; (We were glad to see this, and credit the Railway Club with doing much good) and concluded to take superimposed loads where the sides are higher than 60 inches, and the immediate connection of the B. R. & P., the N. Y. C. & H. R. R. R. will do the same thing. But it stops there, and the P. & R. drops down to 40 inches. They should rebuild their tunnels and bridges if they cannot safely handle the higher loads. We think the rules formulated here by mutual agreement between the shippers and the railroad people are good and safe rules. The shipper stands for safety as much as anyone else. I think we have a whole lot to lose and nothing to gain by putting out an unsafe load.

The matter of cost of blocking that Mr. Kirk referred to is quite an item. I have some figures here from our Homestead Works: We expended for material $87,777.00 and for labor $19.393.00, over $100,000.00 for lumber and labor in blocking steel in one year. That is partly because the railroads do not supply suitably adopted cars for steel shippers, although they do for furniture, hay and coal and such commodities.

Now, we ought to have safe and yet reasonable rules. We shipped during 1905 42,810 carloads of beams and plates, 12,136 of these loads, or over 25% required blocking. Of those 12,136 loads 45% were beams, and 18% plates, and the remainder other material. The percentage of greater lengths is increasing because of a good many customers ordering what they call stock lengths, so that they will have a 70-foot length to cut into 30 or 40 or 20 foot lengths, according to their demands, rather than to wait until they can get cut sizes from the mill. I have here a record also of what this blocking is costing. It is increasing right along by reason of the greater percentage of long pieces. The average cost per ton in 1905 was more than 100% greater than it was in 1902, comparing the tonnage of the two years and the proportion of greater lengths last year as compared with 1902.

About the only thing additional I have to say is that if superimposed loads on cars with sides not over 53 inches high are safe for the Pittsburg & Lake Erie, the N. Y. C. & H. R. R. R., the Erie, the B. R. & P., the Lake Shore & Michigan Southern, the B. & O., N. Y. C. & St. L., and a good many lines, they ought to be safe enough for some of those who are only taking cars whose sides are not over 40 inches high.

MR. R. L. KLEINE: I wish to say a few words in regard to this matter from a road standpoint: It is safety first, gentleman, that we must consider in the transporting of structural material over the road. It is true that the load has begun to get larger and higher right along ,and our troubles have also increased. The most expensive load that we have to transport today over the road is structural material, and the load that gives the most trouble on the road is structural material. To show what it has cost to adjust loads, at one point on our road, after they have traveled some 230 miles I will give you the figures for December and January up to the 17th of the month, a total of $1,091.31. While truly this was not all due to improper loading, some of it resulting from shifting enroute, yet, at the same time, the bracing of the load at the initial point had a good deal to do with it. Our inspectors at the initial points (while I cannot agree with Mr. Kirk that they do not possess reason) may err in their judgment from time to time. But, gentlemen, we must consider that an inspector has not a book of rules for every road that you put out to him. He must exercise his judgment. If that judgment does not coincide with the shipper, he may be thought to be out of reason. However, I believe in education, and the more I rub up against my friend Kirk, the more I learn. And as he told me tonight, he "licked" me once, and he said he was going to do it again, and I am here to take the "licking."

In regard to the diagrams represented: There are certain recommendations made as to overhanging loads (Figure3), that is, to fill the box to the extent of one-half the capacity of the car in addition to the top load which is restricted to one-half the capacity of the car; or, in other words, making the full capacity of the car. Now, if that is done with a superimposed load on your older type of cars (take the car with only two truss rods) the car will not carry it. While we have steel cars that will carry the full capacity if loaded in accordance with figure 3, both a superimposed load and a load in the box, with entire safety, yet there are other cars which are not fit for it. And while I believe that the M. C. B. rules may not be entirely clear on the subject, the point is covered in rule 97 which reads: "If, in order to make up the allowable carrying capacity of the cars, short material is loaded on the floor, with loads as per figures 40, 42 and 43, such material must be loaded in equal amounts on both sides of the car, so as to be properly balanced, and not interfere with the curving of the trucks." Therefore, gentlemen, we now have in the rules that very point covered. It may not be so clear in regard to the amount that may be loaded on the car, and in that respect we may amplify them, but at the same time the matter is covered to an extent. I believe it would be a good thing to have the Railway Club of Pittsburgh appoint a committee to make suggestions to the M. C. B. Committee on Loading Long Material, and to this committee invite the manufacturers, and each year have them present such changes as they have to recommend, after which this committee can thoroughly go over the matter and make recommendations to the M. C. B. committee, which I am sure will have a good deal of weight, and will be, in a general sense, the same as your present committee on M. C. B. rules of interchange.

MR. T. S. KIRK: I understand Mr. Kleine to say that the marked capacity bears no relevancy to the load the car shall carry—I do not quite grasp the philosophy.

MR. R. L. KLEINE: I will explain that to Mr. Kirk: If Mr. Kirk will read his M. C. B. rules for loading long materials, he will find a clause in there that a concentrated load restricts the carrying capacity of the car.

MR. KIRK: Well, now. we ought to have that explained. I have a lot of Poles down there that wouldn't know whether you were talking about concentrated loads or concentrated lye.

MR. KLEINE: I am glad to hear Mr. Kirk admit that he also has people in his employ that do not know how to load a car.

MR. KIRK: My reply to that, Mr. Kleine, is that they are trying to live up to your bible and they do not understand it.

MR. KIRK: I think Mr. Bentley here might give us a few complimentary remarks. I do not believe that we have scored him.

MR. W. F. BENTLEY: Mr. President and Gentlemen: I do not know that the B. & O. has any complaint to make of the present M. C. B. Rules as they stand at present. but it is the non-compliance with the rules that gives the most trouble. That is, there is no doubt, as has been said here, an honest effort made to live up to the rules in every particular, and where they do not comply with them in some point in preparing the loads owing to the service requirements, those are the loads that give considerable trouble. I had some figures that I had expected to be able to give relative to what it had cost the B. & O. at one station to adjust loading due to its shifting, and which the persons who handled the work claimed was due to improper loading; but unfortunately I allowed those figures to remain on the table at home when I started away, and did not bring them with me; but it was not as heavy as Mr. Kleine speaks of for the Pennsylvania Railroad. Now, I fully appreciate the fact that some inspectors at some points perhaps, do not use the very best of judgment at times, but I do not believe it is fair to say that we have very many inspectors on any of the railroads that are devoid of reason. Most of these inspectors, where there is no amplification of a rule which has detailed instructions as to just how the lading should be placed and staked, are governed by observation of similar lading, and its performance in transit, and their object and instructions from all the heads of departments is to consider the load from the point of safety first. It is admitted by shippers and railroad men alike here tonight that that should be the first consideration. And I believe such judgment will prevail in the minds of not only the railroad people and shipper, but it would meet with the approval of the traveling public or any one who had had anything to do with railroads either by traveling over them or working around or about them. It is of course well known that our trainmen do not handle loads, of any description possibly, in the same manner they were handled some thirty years ago. Of course, it could not be expected they should do so. The increased business, the increased capacity of the cars and the limited time and the trackage would not permit them to take the same amount of time in doing their business. I feel that there is possibly some room for further improvement on the rules, and I feel the best way to get at this improvement or to make time is for the representatives of the shippers and the railroads to get together and make recommendations to the committee of the Master Car Builders Association, which will receive proper consideration, and will bring about such results as both sides are trying to get.

As to the point that was brought up regarding rule 15f I think there is room for an improvement. I think the number of bearing pieces there specified as three, could be very well improved.

As to the height of the loading, the height of superimposed lading, the Baltimore & Ohio is not placing any restrictions upon this at this time. I thank you, gentlemen for your courtesy.

MR. L. H. TURNER: I would like to have Mr. Kirk and Mr. Orchard state what proportion of the one-half capacity of car they have used for floor load on figures one and three. And while they are talking, I would like to have them state to what extent the M. C. B. Committee conferred with the shippers in this district concerning these same rules. How much floor loading have you put on a car when it is loaded the same as shown in figures 1 and 3?

MR. T. S. KIRK: Well, we do not put on any floor loading. We do not construe the rules as permitting it. That is the reason I think it should be made clearer.

MR. L. H. TURNER: Mr. Kleine says you are permitted to do it.

MR. T. S. KIRK: The rules are so distributed throughout the book instead of being concentrated, that our men become lost in searching for what should govern in the loading. It should not be expected that the loader must read over the entire Book of Rules to find that which should relate to the special character of his load.

I will relate a circumstance that will serve as a partial answer to Mr. Bentley in regard to the shifting of loads. I had a communication from a Superintendent of a railroad, in which he berated us soundly for not loading so as to prevent the load from shifting. He, in the same letter, advised that he had repaired the load three times during transit. He insisted we had failed to properly load the car. I answered by asking why in h——l he had not made it right when fixing it.

MR. W. F. BENTLEY: Rule 15f I believe, as well as Rule 97, gives permission for the loading of short material in the box of the car. Rule 15f says, "For loads carried on three bearings on each car, the weight of loads so carried must not exceed one-half of the marked capacity of the car; but short material may be carried in addition on the floor of the car, providing the total weight of the load does not exceed three-fourths of the box capacity of the car."

MR. T. S. KIRK: I was figuring on getting the full capacity of the car by loading over the idle truck. If we get three-fourths of the capacity of the car on the blocks, why should we not gain the other fourth by loading over the idle truck on the floor of the car, and thus increase your tonnage and profits?

MR. W. F. BENTLEY: I would say in reply to Mr. Kirk, that I think such could be allowed and still meet the M. C. B. requirements. I think, as he states, it would reduce the center of gravity and make the load safer.

MR. KIRK: It is only a suggestion, put out as it were as a feeler.

MR. W. F. BENTLEY: There is one thing I might mention that possibly has more to do with the shifting of the load than any other one item; that is, the proper jacking of the cars apart to prevent the motion of the couplers when they are loaded on two cars, and insert proper spacing blocks behind coupler horn. I do not believe there is enough consideration given to that at any loading point. I think that has a great deal to do with a great deal of the shifting. I agree too, with the position taken by Mr. Kirk, that, if we have to adjust a load and we do not adjust it right, of course the blame lies with us when those cases come up. After we have done the work once, and it gives trouble the second time, I don't think Mr. Kirk should be asked to explain why it was not loaded right, unless first shifting of the load before railroads had adjusted it, was due to improper loading by the shippers at originating point.

MR. T. S. KIRK: As I figure it you might as well go out into stellar space and lasso a comet and attempt to stop its impetuous flight, as to try to stop the shifting of lading when the train has reached a certain momentum, and you have suddenly put on the air brakes.

I don't think by any conceivable power within the limit of reasonable cost, you can stop the shifting of lading, to my mind, it is a physical impossibility.

MR. H. A. BEAUMONT: Speaking of rule 15f, I think a car so loaded would be perfectly safe. For my part I would not hesitate to accept it; and rule 97 also gives the same authority for loading such materials. I do not know as we have had any trouble with the loaded material in the territory that I cover, and I only recall one derailment on account of the load shifting. We had a projecting load, part of it loaded in the box of the car, and the other end projecting, and if I remember right it was angle iron, and the stanchions gave way, and allowed the load to fall over, which toppled the car over, turned the car down an embankment,—damaging the commodity as well as the car. The greatest trouble I think that we have is at connecting points rather than in around the Pittsburgh territory. However, I am not very familiar with the Pittsburgh territory, or the inspectors connected with it. We have at interchange points a great deal of trouble we interchange with one road which once in a while gets a cranky notion, and refuses lots of cars, and 30 days afterwards they will take the same cars. It seems to take them spasmodically.

In regard to the railroad company paying for the blocking necessary for the cars, that is a question that perhaps Mr. Bihler thinks he is right in, and the railroad companies think they are right. But along this line the railroad companies have gone to a great deal of expense too; it is not alone the shippers. They have tried to provide special cars to be used in the Pittsburgh territory, which have cost them lots and lots of money; cars that were really not fit for coal traffic and cannot be used on our car dumps, and when used for loading coal, they cannot get their capacity by at least 40.000 lbs. are used at a loss for loading coal. The only place they can use them is where there are side tracks, and cars are unloaded into drays.

In regard to good and bad inspectors, it is a question of who is a good inspector. The shippers, of course, have their side, that they have good inspectors, and the railroad company has its side, that they have good inspectors, and very often the poor inspector is the good inspector. He saves quite a number of accidents. Of course, what I call a good car inspector is an inspector that can take a chance without an accident. But there are good inspectors who have poor judgment on loads. They are good inspectors just as far as inspecting the condition of the car is concerned. When it comes down to loads, they are not good.

As to the shifting of loads, there is no question but that as to the majority of the shifting of loads the responsibility is with the railroad company. The movement of cars is very rapid. and in a great many places where they have yards, they give them a sling, and come in contact with other cars so hard that it causes loads to shift. The bombardment is fierce at times. But I do not know as it can be blamed on the switchmen exactly. The railroad companies want the freight gotten over the road rapidly. They have a certain limit of time to get the trains out of the yards, and it is necessary to switch the cars rapidly in order to facilitate the movement.

MR. C. ORCHARD: As to rule 97, quoted by Mr. Kleine, I find by referring to it, that it reads: that short material up to the allowable carrying capacity may be carried on the floor.

Now, the allowable carrying capacity in practice for a top load, as described by figure 2 there, is half the marked capacity. We think that in addition to the half marked capacity on top, that at least one-quarter capacity should be allowed for the short material in the bottom of the car. It seems to be a question of what the allowable carrying capacity is. If it is meant to be three-quarters of the capacity of the car (Rule 15f) it should be so stated in Rule 97. If it is half the marked capacity, which is all that is allowable under Rule 15c, we think that it should be modified so as to allow for the weight of the short material.

MR. G. E. CARSON: Speaking of the loading of that class of cars. I am familiar with their design and that kind of lading, and I cannot see why any of those cars cannot be loaded up to their full capacity. We should be governed by where the bearing pieces are located, and if the bearing pieces are near the center of the car, I am then in favor of loading a sufficient amount in each end of the car so that it will be loaded to its full capacity. On the other hand, if the bearing pieces are located over the truck, then load the opposite end up to its full capacity. Where a load is carried on the top sides, when possible it is good practice to load the car up as high as you can with short material. It will act as ballast and should the bearing timbers break or give way, it will prevent the load from dropping down into the bottom of the car and possibly prevent a serious accident. My opinion will remain the same until some one can explain to me why a fifty thousand capacity car can carry twenty-five thousand pounds on one truck and no weight on the other one. Why an unloaded truck should start out on a long journey is something I cannot quite see through.

As to the lading on that height of cars I wish to say I have handled them for fifteen years and I never knew any of them to give way or to upset. If there ever was an opportunity for them to upset it would certainly occured when taking them out of the various manufacturing plants in this district; which we all know have some very short curves and little attention paid to elevations. If we are successful in getting them out onto good road bed we have very little fear of their upsetting.

About the incompetency of the inspectors. Of course the inspector is supposed to judge whether a car is properly loaded or not. Just as soon as he renders a decision which is not favorable to the shipper, he is then naturally criticised as being incompetent. Much of this friction is caused by the shippers turning cars out to us which are improperly loaded. Such cars generally require just about one-third more blocking, than if they were properly loaded. I have in mind cars loaded with structural iron, with the long pieces on the top and the short pieces in the bottom; which required much more blocking than if the short pieces had been loaded on the top. This, of course, increases the cost of blocking and the inspector is generally the man who is responsible for it. I feel sure that our inspectors as a rule are just as competent of passing judgment on a car properly or improperly loaded, as some of the gang foreman who have charge of a lot of laborers who load these cars for delivery, to the railroads. I am sure we do not pretend to understand rolling mill work and do not understand why rolling mill people understand so much about railroading.

There is one thing in which I do agree with Mr. Kirk. There is no blocking that I can think of and no build of cars that I know of that are sufficiently strong to prevent the load from shifting more or less in ordinary service. The material we are obliged to haul is very heavy and when it shifts there is nothing that will hold it. The only thing to do is to run it to the shop track, jack it back in place and start it out anew.

I cannot recollect of ever seeing a car that had too much blocking on the sides or have never seen bearing pieces that were too strong. This is about all the demands we make of the shippers; viz: To see that the bearing pieces are sufficiently strong to carry the load and enough side stakes and blocking to prevent the load from falling off.

As to flexible material. I have been asked the question frequently what is meant by flexible material. This is the way in which I have interpreted it. Whether the material is channels, eye beams, rails or any other long materials; that if the lengths are sufficiently long so that they sag in the center when resting on their bearing pieces, and fails to support itself in the center. I then consider it flexible material; although the shipper may not term it as such. If I am wrong in this, I would like to be enlightened on the subject.

As to furnishing suitable cars for the many different commodities. It would be almost out of the question for railroad companies to do so. I have been called on to supervise the loading of material that cars could not be properly constructed to carry.

The kind of material I speak of also requires a great deal of blocking and even then it is handled at great risks. The cost of blocking on single loads is not very much, the average cost being one dollar and forty-four cents. Of course double loads are much more costly.

MR. L. H. TURNER: The M. C. B. Committee on this subject believes that both ends of cars are capable of carrying the same load, and I will offer a motion, that the Railway Club of Pittsburgh approve of Rule 15c as it now reads:

Resolved.—That the Railway Club of Pittsburgh approve of Rule 15c as it now reads, which is as follows:

"For loads carried on one bearing piece per car located at or near center of truck or on top sides of high-sided gondola cars, the weight of lading must not exceed one-half the marked capacity of car."

Also that shippers be permitted to load over the idle truck an amount equal to the weight of the other end, and further that the arrangement of auxiliary stake pockets as shown, be recommended as a standard.

PRESIDENT: It has been regularly moved and seconded that we make certain recommendations to the Standing Committee on loading long materials. Are there any remarks?

MR. W. F. KIESEL: With the rule as it now stands, the load as shown by the diagram represent loads of which very few leave Pittsburgh. I had a canvas made of the Pittsburgh District, and found only four loads, and they were not as high as shown in the diagram. The bulk of the loads superimposed on cars leaving Pittsburgh come within 9 feet 3 inches from top of rail to center of load. The mere fact that railroads are now loading on top of cars with 44 and 53 inch sides shows that they will go higher and higher, until an accident occurs. If they have an accident, loss of life will probably follow. I think it is objectionable, especially since shippers do not find it necessary to load to such a height, to put this Railroad Club on record as recommending loading so high in the air. It is unsafe, it is unstable, and it is sure, sooner or later, to cause loss of life.

MR. C. ORCHARD: While we are speaking of Rule 15c, there is something that might be mentioned here with propriety, and that is the fact, that the loading of structural material on two blocks per car is not authorized at all. Rules 15a and b start off with loads carried on one bearing piece per car, as does also Rule 15c. Rule 15d covers flexible plates on two or more bearing pieces, but there is no mention made of loads of rigid material, such as described by figure 2 there, on two blocks per car.

The question occurring to me, is whether the one bearing piece in the rules just referred to is intended to mean the pin block, with the understanding that another bearing piece with slider is to be used on the same car, or whether it means but one block; and that one being the pin or main bearing block, is to be used. If the latter, then Rule 15f should be revised, as it refers to three bearing blocks, which of course, could not be used without sliders, on any twin load, regardless of the nature of the material.

MR. JULIUS KRAUSE: I believe I am one of those Inspectors who has had a great deal of practical experience. I have also seen cars derailed just loaded like that mentioned, and the question was asked me, "Krause," what caused this car to become derailed? I looked over the trucks; there were number one Carnegie Steel axles under them and the track was all right and still the car was derailed. I investigated further and where we had twin or triple loads with lading 11 feet high from top of rail to center of load and when these cars pass over a curve with six and one-half inch elevation. I found flange hard against low rail all but end trucks, bolster spring on low side of car compressed solid and opposite bolster springs not compressed at all. This caused car to lean badly, then taking a plumb line at the center of the load, I found the center of the load was not over center of truck but very close to low rail and where your side bearings are only twenty-five inches from center pin and car passes over a frog it often upsets or becomes derailed.

I might talk of a little instance that I had at the Bridge Works at 52nd street, Pittsburgh. They had a girder to ship 10 feet high and 124 feet long. Our folks at Altoona whom we look to for instructions did not like to haul this girder. I made an examination of the girder and met the Chief Engineer, a very bright man, and he persuaded me to load the girder, using five of our gun trucks. The gun trucks were furnished and the girder rested on two swivel bolsters on the end cars and I was ordered to accompany the cars on their eastward trip. I was delighted. I thought I would gain experience. I rode on the cars as far as they went which was Sang Hollow; that was the end of my trip. The curve at this point has 6 1-2 inches of elevation and the train came almost to a stop and cars were leaning badly, assisted by truck springs being badly compressed on low side. This caused the girder to lean so badly that the two end car bodies and girder upset to low side of track and I jumped to high side just in time to avoid injury. I came to the conclusion after that I would consult my superiors in Altoona when girders are to be shipped, as this lading was only nine feet from top of rail to center of load.

I would say this Gentlemen: Those people who wish to use gondolas with 53 inch side plank for twin shipments, placing bearing pieces on top of side plank, this will bring center of load over eleven feet from top of rail which is not safe. Keep down as low to the track as you can with the center of the load and don't get away up in the air.

But now go back to that flexible material. Here is my friend, Kirk, I like him very much. He has always been a nice fellow and he is a bright fellow. He says, of course, that the railroad takes all the fruit, but looking at his employers, Jones & Laughlin's millions, they have fared right well. But as to the flexible material. We worried with that as Mr. Kirk has said from the time we had 40,000 capacity cars up to the time we had 60,000 capacity cars and when 80,000 capacity cars arrived, we found we could not haul flexible material in the way Mr. Kirk wanted to load it full capacity, 60 and 80 feet long. Mr. Orchard's predecessor also, was loading cars in this manner, and our Monongahela Division people would not accept them. I was ordered up to Munhall to see what caused the trouble and asked our Monongahela Division Inspector: "Why don't you accept cars?" The answer was, they will not stay on the track, and he pointed to the first curve and said: "They will not pass over this curve." I found when you get a flexible sheet 60, 70 or 80 feet long it is just as stiff as can be one way, but very flexible the other way, and when you pile 80,000 pounds on one car, lading three feet wide that the pressure on bearing pieces with sliding bars become so great they are torn out. If it would not tear out then lading would not slide and hold the cars in straight line and derailment would take place when passing over curves.

The Master Car Builders came to our relief, making rules that you must not load full capacity of flexible material and increase your sliding bars to one-half inch thick and six inches wide and put grease on them. But we have another thing to worry about this flexible material. They tell us to fasten it on the rigid bearing pieces, one on each car, and the balance of the bearing pieces will have sliding bars and it will slide nicely. We very often find about one-fourth of the load is long flexible material 60 or 70 feet long, this has proper overhang on rigid bearing pieces while three-fourth of lading is 20 feet shorter and has no overhang but is loaded in between the long pieces. Then we have three-fourths of the load resting on the bearing pieces with sliding bars only, and the result is that we have to cut the cars out after moving them ten miles and have lading readjusted. They are in bad shape as a general thing, the bolts tore out of bearing pieces which hold the sliding bars. In fact it is only three weeks ago since Mr. Kirk loaded a load of that kind and I had to send for a work train. We did not even reach Wall before the work train had to adjust lading, while I have no doubt Mr. Kirk would say, I loaded it right. The conductor told me it received no rough handling while in his charge. The lading consisted of a large part of flexible plates too short to reach rigid bearing pieces. I would recommend a compliance with the rules if you want safety, or you will be like the brakeman who said: "Oh! I have jumped off trains a hundred times," and the next morning was found with his legs cut off.

MR. R. L. KLEINE: Speaking of loads as per figure one and figure 2. In the first place your bearing pieces do not come, in all cases as placed on the drawing. The spacing of the bolsters is governed by 7-10 of the total length of your load, and the bearing pieces, therefore, may be placed in the center of the car as well as is shown. The sketch is pretty ideally drawn; but your loads don't come that way when you examine them. If the bearing piece comes in the center of the car on the top of sides, (I want to speak of this "concentrated lye" load, or a load on one bearing piece) the total load on top sides and in the box of the carrying cars must be governed by the construction of the car for the same reason that if you are loading on the floor of the car your M. C. B. rules state, in rule 15a, that the amount of load depends altogether on the number of longitudinal truss rods under the car. Now, you want to set this aside and say, "We will put full capacity on those cars." You cannot do it under your present M. C. B. loading rules, and, therefore, I hope this motion will not prevail.

In regard to the high loads, allowing them to go as high as they can be loaded, I would say, gentlemen, that we have had those loads to upset, and the height of same was restricted on account of accident, and I for one, as a member of this Club, would not like to see that motion pass here; as I consider it absolutely dangerous. And as Mr. Kiesel has said, we measured up a good many loads out of the Pittsburgh district, and very few of them went above the nine foot three inches from top of rail to center of load, and as that is the safe center of gravity figured out by the railroad engineers, I do not believe we should exceed it. But in place of Mr. Turner's motion I would offer a motion to appoint a Committee from the Railway Club of Pittsburgh, as I suggested before, and have the shippers present to these representative members from the different roads centering in Pittsburgh, their suggestions each year, and then let them be passed upon and forwarded to the M. C. B. Standing Committee on the Loading of Long Material.

MR. F. A. OGDEN: Mr. President, I am not a member of the Railway Club, but I represent one of the shippers, and am here at the courtesy of your Secretary. Mr. Turner asked for some information a short while ago that has not been answered; That is, did not the shippers meet with the representatives of the railroad companies in regard to the rules for loading long iron. The shippers did meet with the representatives of the railroads about a year ago, spent a whole day going over these rules, went away, came back in about a month, and went over them again, and the rules that we have now are the result of those meetings. In reply to the question whether the shippers in the Pittsburgh territory in the iron and steel business are willing to meet with the Committee of the Railway Club members, I can speak for the shippers, and say that we would be glad to meet with the committee representing the railroads, Railway Club or with the Committee of the Master Car Builders Association. Now as to the rules. We have heard tonight that a shipment went off the track three times on the Philadelphia & Reading Railroad. It seems that this shipment passed all right over the B. R. & P. and New York Central tracks. In this case it looks to me that it was not the fault of the load, but the fault of the track. We have heard that the equipment of some of the railroads is old and worn. A man prominent in railroad circles told me that the capacity of their cars was raised 10,000 pounds one time with a paint pot and brush, and I suppose the rules for loading have to stand for that. Now you have heard from another source that the crews operating railroad trains handle them roughly, more so than they did in times past. Mr. Turner tells us that shipments such as designed by the diagram on the wall, and covered by the motion that he offers, had gone through very nicely, and I think when you look up the account of wrecks, and loss of life, it is more due to bad management, and rough handling in the trains and in the yards, than it is to the fact of the way shipments are loaded. I have seen it myself, because I have seen in my time considerable switching done by yard crews, and I have seen magnificent box cars, almost new, smashed to pieces by careless and rough shifting. Now there is one feature of this double loading proposition that appeals to us further than the blocking, and that is that your

Traffic Department says to us, "Unless you put so much on these cars you will have to pay for that much," and your Transportation Department turns around and says, "If you do put it on we will not move the car." Now we are between the devil and the deep sea. You will assess us if we do not put it on, and you will not move the car if we do put it on. Now loss of life is involved in these rules, and safety and security to property, therefore, we should arrange our Rules in such a way as to give security to life and property, but there is a wide margin to work on in these Rules, between being over safe and under safe, and at the same time give a square deal to the shippers in the weight to be loaded. Until recent date the Southern Railroads and the Western Railroads classifications demanded 60,000 pounds as the minimum weight for double carload, and this same minimum is demanded today on shipments to the Pacific Coast. The minimum charge East of the Mississippi and North of the Ohio River is 45,000 pounds for two carloads. You will readily see that if we load two 80,000 pound cars, and the Master Car Builders' Rules will only let us load these cars to 25 per cent of their capacity, that we will only be able to load 40,000 pounds on the two cars, making excess freight charges into all territories for the reason that the minimums demanded by the traffic people is greater than the maximum load allowed by the rules, and on a shipment to San Francisco, or other Pacific Coast points. You will see that we will have to pay $150.00 excess charges on a shipment as mentioned above, and if 100,000 pound capacity cars are used we will have to pay $75.00 extra, the rate to San Francisco and Pacific Coast points being 75c per one hundred pounds. Now what are we going to do? We have to pay this money because we cannot put the material on the cars. I do not think your Traffic Department can legally demand a higher minimum than the maximum load provided by your rules, but of course that would be a case that would possibly have to be decided in court. It seems to me to be your duty in legislating on these rules to present the matter to your Traffic Department, and come to some understanding so that the shipper will not be penalized in this manner. We are already put to the expense of paying for the blocking of the cars. These shipments have come, and they are going to stay. They are going to be greater in the future than they are now. You provide cars for most every other material except the iron and steel business. We do not admit today that you have supplied a car especially for the steel business. Sometime ago we designed a car for the Baltimore & Ohio Railroad. It was the result of the work of Mr. Bihler, Mr. Townsend, and several other industrial traffic managers. This car could be used for almost everything that could be transported in an open car. It was a gondola car, drop end, drop floor, 42 feet long, 30 inch sides, which would do away with all the controversy over these rules. Now this trouble, I think, will work out if the railroad companies will put into this business the right kind of cars. At the two meetings we had with the railroads, legislation was suggested there that they would put all the long iron business into the hands of the Pennsylvania Railroad Company. The B. & O. and the P. & L. E. could not handle the business because they could not furnish the equipment that would permit of sufficient loading to meet the minimums demanded by the Traffic Association, which, of course, would have seriously interferred with the handling of the structural steel business. I am just telling you some facts which came out at that meeting. Mr. Turner, Mr. Kirk, Mr. Bihler and Mr. Orchard, and some of the rest of the gentlemen present will confirm what I say. Now to settle this matter properly it seems to me it should be brought before the Traffic Department, and my suggestion is that the matter be one for consideration by the Traffic Department as well as the Transportation Department, as it is a matter that both are vitally interested in. We, as shippers, will be glad to meet anybody on the railroad side. We have had a conference with one department of the railroad, which has done an immense amount of good, and we are going to have another one next year. We, of course, cooperate one with another, and if we do the same with matters of this kind, I think it will bring about a great amount of good.

MR. J. J. TATUM: There has been a great deal of talking going on, and I believe all of us should say something if we can help the matter any. The question is apparently to me, as I understand it, that the railroads are causing shippers an unreasonable expense. I believe, though if the shipper knew as much about the total expense, that is, what it is costing them to load the car, and what it is costing the railroad company to handle the car and the load after it is loaded, that they would not think they were imposed upon in any way. I believe if they knew the total figures they would find the railroad was paying the greatest part towards getting the load over the road. I remember about a year ago, maybe two, that we were about to get up a new set of rules governing the loading of long material, not only long material, but all material. We wanted to be as fair to the shipper as we possibly could. We wanted to give him an opportunity to ship as much as he could with as little expense as possible, but we wanted safety with it. We must, as a railroad, protect life; we must protect the property of the road; we must guarantee or promise the shipper safe shipments or transportation for his material. If we are to do that, we certainly have to lay down a rule or a law that will arrange the material safely on the car for transportation. The shipper thinks the inspector is possibly too rigid and not fair, but if he was at the other end of the line and saw his load after it had moved about two or three hundred miles, and saw its condition he would not think that the inspector was too hard on him, in his efforts in insisting on getting cars properly loaded.

At Baltimore we have considerable lading from the Pittsburg district, and I want to say that we are cutting cars out every day on account of the bad loading at the originating point. We are using wrecking cranes to re-adjust those loads at a very great expense to the company, not only in actual cost of labor and material, but in delays to trains and transportation, which means a great deal to a railroad company, under the existing business conditions. We want, as I said, to help the shippers; and a while ago we consulted the shippers in the Pittsburg district as to just what sort of car would suit their business best, and we tried to build a car that would give them the greatest lading at the least cost, and I believe the most of the railroads running into this district today are trying to do that. It must be understood too, in considering this loading and handling, as has been said, roughly in yards, I believe that we have some bad train men, but not all. I believe we do have some rough handling, but it is not all rough handling. We have some bad workmen in our shops, but they are not all bad, and I do not think that the shipper or the inspector should try to defend himself by unloading the burden on the man handling the train, because it does not all belong to him. I think we should all try to bear that burden equally. There is some fault with the inspector; there is some fault with the train crew; there is some fault with the shipper. The only way to correct this, is to get together, as has been suggested, and suggest what we would think would make a safe loading, and recommend it to the M. C. B. Association for their committee, which I believe would be very acceptable to them. The M. C. B. Committee have had some reason for recommending their practice. I do not think we should attempt to change it or any portion of it, without first finding their reasons for recommending it; because, if we did, we may be doing wrong, and as to this double loading that we have had reference to (figures 1 and 2) the M. C. B. Committee certainly had some reason for making this limit of that loading, and it should not be changed until we consult them to find their reasons for it, and then give them the reasons of the Pittsburgh Club for changing, and I believe, if it is right to change it, they certainly will agree to change it.

MR. A. STUCKI: As mentioned already by nearly every speaker tonight, safety should always be the first consideration. Now in regard to the loads as shown by the diagrams, we have heard that they safely passed in ordinary service. This does not need to surprise us, as long as there is a floor load present, as in this case the center of gravity of the whole car will not be much more than six feet above the rail.

This dimension is considered the limit, above which we should not go, and tests and years of experience have shown, that if we do go higher, the resultant of the center of gravity on curves, will, in severe cases fall outside the rail and the car is bound to leap.

If I understand matters right, the present M. C. B. Rules under question allows a top load of unlimited height without any floor load what-so-ever. This, gentlemen, means trespassing on dangerous ground.

Limiting such a top load to 9′ 3″ such as has been mentioned here tonight, and figuring the car at about 40,000 pounds, would bring the center of gravity just about right and would make the load safe for general service.

Under the circustances it would seem wise to modify the M. C. B. Rule in question, so as to provide for a floor load with the top load, or else to limit the latter in height to 9′ 3″. This would provide for absolute safety and still would give the railroads and the shippers the full benefit of the capacity of the cars, as in the few cases, where a floor load cannot be had, a sufficient number of low side gondola cars can be found to take care of such exclusive top loads without going beyond the height specified.

The other suggestion made here tonight, to appoint a committee to take care of this point as well as many others, I consider well taken.

MR. L. H. TURNER: I would like to ask Mr. Carson to state from his personal knowledge, as to whether loads as outlined on those sketches are going out of the Pittsburgh district, and what numbers.

MR. G. E. CARSON: As I said before, I am thoroughly acquainted with that style of lading. If it is unsafe and above the center line of gravity, then they had better change the line of gravity so far as we are concerned. That style of lading has traveled and is now traveling to all parts of the country. We have no record of any other company refusing to haul them and we have never had any accidents with them. When looking at the sketch they do look a little balloon like; but you know it is pretty hard to upset a balloon. Of course, we all know there is a limit to this, but with the success we have had, we cannot help but think that we are not beyond the safety point.

MR. C. ORCHARD: I am sure that it is not the intention of shippers to load to extreme heights, and I think that the height of 13′ 2″ shown on the sketch is a great deal higher than any loading we ever turn out.

Mr. Turner in his motion specifies a floor load of 1-2 capacity under a superimposed load of 1-2 capacity. The shippers do not ask for that concession on all cars, but would be satisfied with an allowance of 1-4 capacity floor load under a top load of 1-2 capacity. Authority to load modern 100,000 pound capacity cars with a floor load of 1-2 capacity might, however, be given with safety.

MR. W. F. KIESEL: I would like to ask whether the figure 1 represents the superimposed load of half the capacity of the car on each car?

MR. L. H. TURNER: It calls for a floor loading equal to the amount carried on the other end.

MR. KIESEL: I am referring only to the superimposed load. Is that superimposed load on each car half the capacity of the car? Does it represent an actual load that was sent out, as it stands there, with the figures, as shown on figure 3?

MR. G. E. CARSON: Yes, sir, that represents an actual load. The figures as they stand there, and they have been going out in that manner for years.

MR. KIESEL: Half the capacity on each car?

MR. CARSON: Yes, sir.

MR. KIESEL: And they go through safely?

MR. CARSON: Yes, sir, to all parts of the country.

MR. W. F. KIESEL: Then it is rather odd that we could never find such loads when we searched through the Pittsburgh district. Mr. Turner sent me quite a number of records of heavy superimposed loads that were loaded in Pittsburgh, and not one, that I can remember now, came up to that height. As a matter of fact, shippers do not always have short material to put in the bottom of the car. They load on top of the sides, and if they are allowed to load to any height on 53-inch car sides, they will do so, and if they have higher cars, they load on higher cars. The rules now allow a load of 25% in the body of the car in addition to 50% on top of car sides. It has always been advantage to put that 25% in the body of the car, because it helps to steady the load; but when they have no short material to put in the body of the car, should they load up to the height as given by Mr. Turner? The distance from top of rail to center of gravity of car and load is 7 feet 2 inches. This is certainly above the safe limit of 6 feet, on which basis the railroad company always figures. Six feet is assumed to be the limit of safety, because in going around curves, a side thrust, which is estimated at .4 of the vertical load, is created, and if you consider the height of the center of gravity as six feet, the direction of the resultant force is through the outside rail. Anything beyond that will upset the car. For this reason, I say again, that if loads are placed on top of cars in the manner illustrated in the diagrams, without anything in the boxes of the cars it is dangerous on every railroad, except, possibly, a road that has no curves. I know of at least 20,000 cars which come into this district which have 30-inch sides, in which you can load half the capacity on top of the sides, and come within the limits of 9 feet 3 inches from the center of load to top of rail.

MR. L. C. BIHLER: At the present time the P. R. R. Co. is the proud possessor of some 20,000 steel underframe cars with sides 30 inches high and drop ends. The P. R. R. Co. does not haul many loads like figure 1. Most of their double lengths go down in the box of the car. It is the roads who do not own so many drop end cars as the Pennsylvania who have more of these high loads to contend with. The P. R. R. Co. with its equipment is in a position to stand firm on the strength of their 20,000 modern cars. The B. & O. road followed the Pennsylvania and built 2,000 cars with 30-inch side and drop ends. The last railroad to come in was the Wabash, who contracted for 4,000 cars, 41 feet 6 inches inside, and with the sides 50 inches high. The car I speak of now, 41 feet 6 inches in length, will take two lengths of pipe. Pipe is shipped in 20 feet lengths. It will take in two lengths of pipe; load will not be too high, and almost full capacity may be carried.

The main feature is that the roads who continue to provide proper equipment will carry the bulk of the long material. We freely admit that the drop end gondola with low sides is a step in the right direction and ought to be followed by all of you as soon as you can get down to it. The B. & O. car has 30-inch sides, the P. R. R. car also. The fact that some of these modern cars will not go through the car dumper of a furnace plant, which does not produce structural ought not to be used as an argument against a man who only has a furnace plant. They should go to the furnace man (who does not make structural steel) and tell him they are going to build the modern long cars so that he may consider the question of remodeling his car dumpers; but it is hardly fair to say that the furnace men have not met the situation, if they have not been told in advance of the railroad company's intention of fixing the composite car. Until this ideal condition is arrived at, when all railroads will have 20,-000 or more drop end modern cars, it is a question of co-operation between the shippers and the Motive Power Department, and the Traffic Department. Until then we should have some relief from the Traffic Department, not making your minimum too high, and we will still contribute our share; but if you all get to work toward a common basis, the composite car, a great many of the high loads will disappear and the load of steel will go down in the box of the car and not be suspended in the air. I do not quite agree with the gentlemen who said that the railroad company could not afford to do it. The Pennsylvania has set the pace, the B. & O. followed, the P. & L. E. followed, and I think Mr. Turner has an order in for 750 cars with drop ends, and the Wabash has also bought 4,000 long cars. So, as I said before, it is a question of co-operation, and you will find us willing at all times to be with you, and do what is best for common good, and get down to what is reasonable. We have safety in mind as much as anyone, and stand for safety first and expense afterwards.

PRESIDENT: The question of appointing a committee to consist of railroad and shipping interest is a good suggestion. It is a little late, however, for this year. It is contemplated that the meeting here tonight will be in a measure for the benefit of the standing committee, and our proceedings will be forwarded to the standing committee. I hardly think we need worry very much about the proper consideration being given to any recommendation that we may make. The standing committee is made up of roads in various sections of the country including the Pittsburg district, so that whenever this matter is presented to the standing committee, there will be an opportunity for such persons as may be a little skeptical about the center of gravity, to present the matter before the committee. Possibly Mr. Turner would modify his motion in regard to the height, so that the balance of the resolution might be acted upon favorably. How do you feel Mr. Turner? Do you have very many loads that run that high?

MR. L. H. TURNER: I am informed by Mr. Carson that the loads are going out at that height and going out safely. The center of gravity cuts no figure at all as long as the loads are being hauled safely, and I have no change to make in the resolution. Vote it up or vote it down.

PRESIDENT: Well, gentlemen, you have all heard the motion, all in favor of the motion as made by Mr. Turner will signify it by saying aye, contrary no.

(A vote being had, the President declared the resolution as having been passed.)

PRESIDENT: This discussion certainly has been very interesting, and no doubt will be of benefit to all concerned. We expect to have some refreshments, and even though the hour may be a little late, we hope you will all stay and participate.

ON MOTION, the meeting adjourned.

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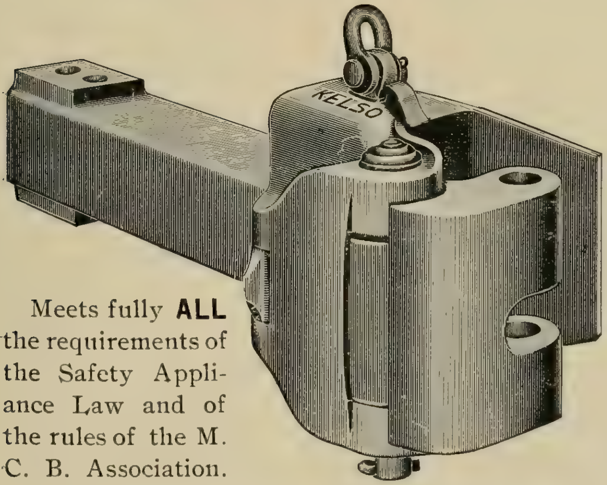

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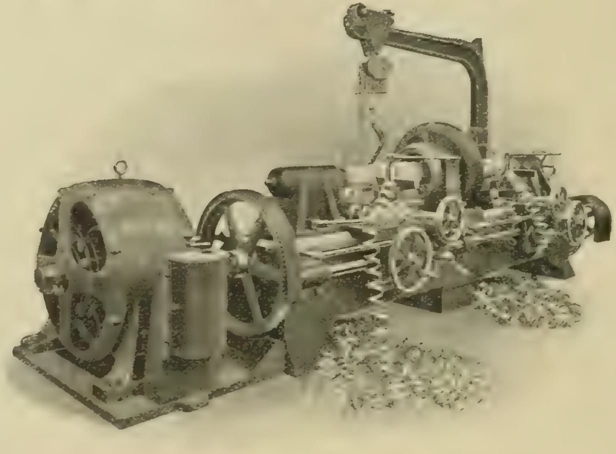

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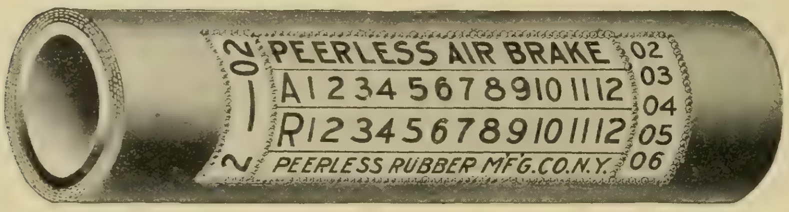
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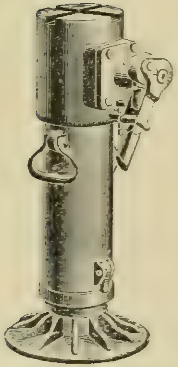

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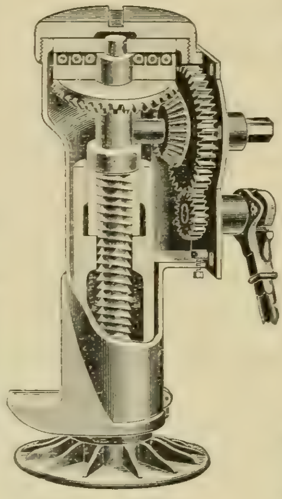

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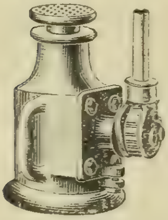

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VOL. V.
No. 4.

Pittsburgh, Pa., Feb. 23, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

FEBRUARY 23rd, 1906.

The meeting was called to order at 8:00 o'clock P. M. at the Monongahela House, Pittsburgh, Pa., with President F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Allen, H. L.
Allen, Jas. P.
Anderson, H. T.
Barnsley, Geo. T.
Bealor, B. G.
Bihler, L. C.
Brand, Thos.
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Brown, E. W.
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Courtney, D. C.
Dambach, C. O.
Ditchfield, F.
Elmer, Wm., Jr.
Forsberg, R. P.
Garland, C. W.
Gearhart, J. A.
Haring, Ellsworth.
Henderson, J. W.
Hill, M. H.
Holbrook, David O.
Hood, D. G.
Howe, D. M.
Huchel, John.
Jacob, W. W.
Jennings, F. R.
Kershner, Robt. L.
Kintner, D. H.
Knickerbocker, A. C.
Knight, E. A.
Lace, Thos. C.
Lindstrom, Charles A.
Long, R. M.
Ludgate, B. A.
Millar, C. W.
Miller, F. L.
Milligan, Wm.
Mitchell, A. G.
Morse, E. K.
Murphy, W. J.
McFeatters, F. R.
McIlwain, Harry.
McIlwain, J. D.
McMullin, F. V.
McNulty, F. M.
Orchard, Chas.
Peacock, W. W.
Pendleton, D. D.
Porter, H. T.
Porter, H. V.
Redding, D. J.
Reese, F. T.
Ryan, Wm. F.
Sattley, E. C.
Schomberg, Wm. T.
Schuchman, W. R.
Slocum, A. W.
Smith, D. W.
Spangler, C. P.
Stark, F. H.
Stelle, C. A.
Stratton, G. W.
Suckfield, G. A.
Tate, Ralph H.
Taylor, H. G.
Tracy, M. S.

Turner, L. H.
Walsh, C. W.
Warne, J. C.
Warnock, H. R.
Wendt, Edwin F.
Weisbrod, J. F.
Wharton, Wm. M., Jr.
Wilkinson, J. A.
Whitney, Louis B.
Zinsmaster, F.

VISITORS.

Allen, W. S.
Anderson, J. B.
Auten, J. C.
Beck, W. H.
Bell, W. C.
Belsterling, C. S.
Blackford, F. G.
Bonebrake, P. A.
Bowman, D. .M
Brown, E. C.
Brown, H. W.
Chadbourn, W. H., Jr.
Conneely, E. K.
Conrad, O. A.
Cornish, Lorenzo D.
Cumings, Robert A.
Dix, John W.
Evans, J. C.
Geiger, Wm. A.
Gilmore, W. L.
Griswold, W. W.
Henderson, A. M.
Hillary, W. R.
Hunting, E. N.
Jackson, C. H.
Johnson, Jno. F.
Lazcuby, C. C.
Lang, C.
Leonard, J. F.
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Moyle, J. H.
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Wirth, A. A.
Wood, W. B.

The minutes of the last meeting, being in the hands of the printer the reading of them is by common consent dispensed with.

Secretary Conway read the following applications for membership:

NEW MEMBERS.

Belsterling, C. S., Traf. Manager, American Bridge Co., Frick Building, Pittsburgh, Pa.

Boyd, Henry W., Chief Clerk, Penna. Car Wheel Co., 499 Preble Ave., Allegheny, Pa.

Collins, William, Car Foreman, Monon. Con. R. R. Co., Second Ave. near Bates St., Pittsburgh, Pa.

Coudit, E. A., Jr., Representative The Rail Joint Co., Lewis Block, Pittsburgh, Pa.

Cox, P. L., Road Master, Monon. Con. R. R. Co., Second Ave. near Bates St., Pittsburgh, Pa.

Crute, W. R., Asst. Engr. of Tests, Norfolk & Western Ry. Co., Roanoke, Va.

Dawson, W. J., Jr., Freight Agent, B. & O. R. R. Co., West Homestead, Pa.

Drayer, U. S., Draftsman, P. R. R., Altoona, Pa.

Elliot, A. H., Special Apprentice, Penn'a. R. R., Altoona, Pa.

Felix, Otto F., Sec. & Treas., Pittsburgh Supply Company, 439 Water Street, Pittsburgh, Pa.

Harrison, F. J., M. M., B., R. & P. Ry., Du Bois, Pa.

Hetherington, S. C., Spl. Apprentice, P. R. R., Altoona, Pa.

Lynch, A. C., Gen. Wreck Master, Penna. Lines West, Mahoningtown, Pa.

Minor, H. C., Special Apprentice, P. R. R., 1218 14th Avenue, Altoona, Pa.

Ogden, F. A., Gen. Freight Agent, Jones & Laughlin Steel Co., Pittsburgh, Pa.

Thornburg, J. K., Car Tracer, Carnegie Steel Co., 915 Ross Avenue, Wilkinsburg, Pa.

Townsend, J. F., Traffic Manager, National Tube Co., Frick Building, Pittsburgh, Pa.

Walters, Thos. J., Commercial Agent, B. & O. R. R. Co., Pittsburgh, Pa.

Wood, Walter B., Rep. The Forest City Paint & Varnish Co., Ferguson Bldg., Pittsburgh, Pa.

Young, A. G., Traf. Manager, American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.

PRESIDENT: As soon as these names have been favorably passed upon by the Executive Committee the gentlemen will become members.

PRESIDENT: There being no further business, we have with us Mr. Cummings, an eminent engineer here in Pittsburgh, who has kindly consented to give us a talk on Concrete Construction. It gives me pleasure to introduce Mr. Cummings.

MR. ROBERT A. CUMMINGS: The President of this association has informed you that I have a paper. He did not tell you that in his invitation to me, he sent along one of the interesting papers presented before this club which was so formidable and so well written that had I not made my promise to him that I would prepare a paper before seeing that I would not have consented to write a paper. As a matter of fact, I have no paper to present to you, but I expect to open the subject of Re-inforced Concrete and a general talk on the elementary features of concrete. That is to say, I do not wish to go beyond, into the theoretical discussion, because I think possibly we are going too rapidly into concrete construction and we ought to take a sort of marked time step and see where we are at.

Reinforced Concrete.

BY MR. ROBERT A. CUMMINGS.

The re-inforced concrete of which I wish to speak to you is a combination of concrete, reinforced with metal. But all concrete with metal imbedded in it—all metal imbedded in concrete is not reinforcement. For instance, where you have an I beam for culverts or in railroad bridges, with concrete surrounding it, it is not reinforced concrete as is understood by men engaged in this line of business, but is what might be called concreted steel, if you please. The concrete forms a protecting medium for the steel rather than the steel a reinforcement for the concrete.

Now, the advantages of reinforced concrete may be said to be of a constructive nature, that is to say, the metal is there for the purpose of increasing the strength of the concrete. Among the advantages may be mentioned its fire-resisting qualities. That applies to railway work as well as to ordinary building. The repairs and maintenance charges are very small. In connection with this subject I wish to sketch what might be called the reason for steel being imbedded in concrete. The first and simplest is a plain simple beam.

(The author here illustrated by sketch.)

Now, in connection with this disposition of steel in concrete beams and concrete structures, there are about fifty different patented systems in existence. I hardly think it advisable to go into that feature of it. But there are one or two systems prominent in this country. First, one brought over from Europe and known as the French system.

There are other methods using a simple rod at the bottom with various complex forms of wire twisted backward and forward. These systems of reinforced concrete are aimed to place the steel in the most economical manner according to the individual conception of the designer. In the United States we have had a great many devices designed for the purpose of increasing the value of the steel in the concrete, but the plain running bar is almost universally used.

It has been found that in straining or stressing the steel in an ordinary beam the steel reduces in diameter as the stress is brought upon it. In other words, the strain on a steel rod is proportionate to the stress brought upon it, as far as its elasticity is concerned. Just as, for instance, a rubber band is reduced proportionate to the stress we bring upon it. This with the steel is sufficient to break the bond between the concrete and the steel. In order to meet that condition there have been designed in this country by two or three very eminent engineers bars with deformed surfaces. The first that I know of was that of Mr. Ransom, who designed the twisted bar. He also had a triangular section which he twisted to form a deeper corrugation. Then Mr. Thatcher and Mr. Johnson brought out their respective bars, which I have here. The Thatcher bar is formed by compressing the round section every few inches. The Johnston bar is designed by Mr. Johnston of St. Louis, and is a very similar arrangement. It also has depressions, but they might be called ridges. This bar shown here was made by a concern at Warren, Pa., and is but another method of accomplishing the same result. The purpose of all these deformations being to produce a mechanical bond in the concrete so that the tensile stresses existing in the bar shall be transmitted to the concrete so that the concrete shall act more efficiently.

There are two or three methods of floor construction. One is the expanded metal that is made of sheets and laid in the cement and so reinforces. Here is another method, the Clinton wire mesh and the electrically welded fabric. For actual strength there is no question that this method is very much better than expanded metal.

Before starting my discussion upon this subject of reinforced concrete I want to mention the fact that it is not a novelty. I have brought with me tonight a book prepared in 1885 describing what was called the Baton and Goodrich system of repairing railways and other structures, which contains the first application of concrete in the United States, I believe. In this book is a paper by Mr. ———, written the 15th of July.

(The author here read abstract.)

In the relining of the Bergen tunnel near New York Mr. Goodrich applied the first structural reinforced concrete tunnelling that I know of. It consisted of lattice girders bent to the form of the tunnel and bedded in concrete. I hardly think this subject needs very much elaboration.

Now I have spoken of the steel. Now, in regard to the subject of concrete itself, I think we are going too rapidly. I think we ought to go back a little and see what concrete is made of—or what it is supposed to be made of. Ordinarily speaking, Portland cement, sand and gravel or broken stone form the combination. What is Portland cement? There are not very many railroad men who have taken the trouble to investigate the manufacture of Portland cement. We have our specifications and all sorts of things to protect us against the manufacturer. That applies also to steel. I have thought it advisable to bring two or three samples of the materials that enter into the manufacture of Portland cement. The raw materials may be said to consist of limestone and shale—sometimes clay. These two ingredients are mixed together in different proportions, depending upon their chemical analysis and ground. This powder in the wet process is mixed into a sort of a mud and settled. The dry process is used in 99 out of 100 manufacturing plants. The dry powder is carried to a rotary kiln and started in at one end. At the other end is an intense flame from powdered coal. In this kiln these products are burned to incipient fusion forming a clinker. That clinker is cooled in an air cooler and conveyed to the mills for final grinding and there it is ground into what is known as Portland cement.

Now in the manufacture of Portland cement there are likely to be a great many slips, so that there is a necessity, not only on the part of the manufacturer but on the part of the purchaser, for a very careful test of all that you purchase. A great many engineers and a great many people I know say that we get good cement now-a-days and there is no necessity for testing it. I do not agree with that at all. I think there is an absolute necessity for testing every shipment of cement. There is not a manufacturer in this country or anywhere else who does not occasionally run through a bad lot of cement. And that applies, by the way, to Pittsburgh steel also.

Having covered the question of Portland cement, briefly, the next step will be the sand that is used. In the Pittsburgh district we have a very excellent sand out of the Allegheny river, provided that it is clean. That is the great point. I do not think we know what clean sand is in Pittsburgh, at least I have not seen anything of it. I have here a material that is the product of all Pittsburg furnaces, commonly known as slag sand. We have thrown it away, filling our railroad banks with it, when we could use it for our concrete work. It has the added advantage of being very light. It does not weigh more than two-thirds the weight of ordinary sand, and the result is that your concrete structure is that much lighter.

Now, in regard to the aggregates that we use, we have not very much option in Pittsburgh. We have the river gravel—that also needs washing. The reason for that is this. Here is a piece of concrete made of gravel. Here is where a stone pulled out because it was covered with some dirt or oil, and cement would not bond with it. Here is a stone in the concrete that was clean, and it would take quite an effort to pull it off. So that our gravel, in order to be good concrete material, should be perfectly clean. I think if we realized that more we should get better concrete. I have seen in some of the railroad structures of this city mud, absolute and positive mud—and yet we wonder why concrete cracks. The trouble is with the sand and gravel companies. They use a screen about four or five feet long and their idea seems to be to produce quantity independent of quality. The great bugaboo about the concrete business is that it cracks. Of course it does, and always will, unless you properly manufacture it. It is a manufactured product like iron or steel and needs to be carefully manufactured. Broken stone would make very much better aggregate if you could get good stone, but you cannot get it unless railroad rates change.

Having mentioned sand and gravel as the aggregates of concrete the next subject is the proper proportions, and this will depend very much upon the purpose for which it is intended. For structural purposes, such as columns and beams and any other form subject to stress, you need to take special care so as to get the compressive value of your material. If you wish to produce a given unit value of your concrete you have got to prepare your aggregates accordingly. To illustrate, about three years ago I made a water-proof tank of concrete out of 1, 3 and 6 mixture, one barrel of cement to a cubic yard of concrete. That is the ordinary stuff you put in your foundations. That is impossible under ordinary conditions except by a careful balancing of the aggregates. By that I mean this, given a cubic yard of gravel, there is a certain percentage of voids, and if your gravel is at all ——— there will be a certain percentage of moisture. The best concrete is the densest, that is to say, the most solid. In order to make a solid concrete it is necessary to fill these voids in the aggregate. In ordinary gravel that will run from 33 to 50 per cent, depending upon the size of your gravel. If you have gravel of a uniform size you will have a very much larger percentage of voids.

Whatever your voids may be, the object is to fill them, and the next material you have to fill them with is the sand. You therefore proportion your sand to fill as much of the voids as possible. The sand also contains voids, as much as 33 per cent, in order to fill which you want a certain amount of cement. Cement also has voids and that can ordinarily be neglected. A careful proportioning of your cement, sand and gravel is necessary if you wish to produce a dense and excellent concrete, otherwise 1, 2 and 4 or 3 and 6 may mean anything and everything. It means absolutely nothing, it is absolutely absurd from my standpoint for any intelligent engineer to arbitrarily put down in his specifications 1, 2 and 4 or 1, 3 and 6. If he wishes to practice his profession properly he will first of all take the materials he contemplates using and determine the average voids to be found in the gravel and in the sand and so proportion his mixture as to properly fill them. It does not cost a cent more except the effort of making the test, but it is one of the things that is absolutely neglected. Take the item of stone. We receive our stone as it comes from the crusher. We find we have a certain amount of one size and a certain amount of another. There is a mathematical problem that can be solved right on the ground.

The next item under consideration, after getting your aggregates properly balanced so as to get as dense a concrete as you possibly can at no greater expense, will be the subject of mixing. There are several methods of mixing concrete, just as many methods as there are men doing the mixing. It is well known that concrete well mixed makes a very much better material than if it is indifferently mixed. The hand method, except in small cases, is going out of use, the machine mixers are reliable and to be preferred. There are a large number of mechanical mixers on the market and I think there is not very much difference in them. There should be, however, some considerable attention given to the amount of water in the mixer and that will depend very largely on the purpose for which your concrete is intended.

Ordinarily speaking, a wet mixture is more satisfactory. There is less manual work about it, it so to speak solidates itself. But there is one feature of wet mixing I want to emphasize and that is the liability of the stones or gravel to settle to the bottom and the cement to rise to the surface. That is particularly true where you have structural concrete which is invariably mixed very wet. I do not think, ordinarily speaking, that you can get too much water. The so-called drowning method I do not think exists. The cement will take up a certain amount of water and throw off the rest. The water will not combine with the cement, it will simply flow away.

The methods of erection, false work, etc., I need hardly go into. It is very essential to have rigid forms in all cases. The finish of your concrete will depend absolutely on the form you use. Concrete put in a glass bottle will have a glossy finish. The same thing may be said of concrete finished up against planished iron. If you put a rough wooden form up against it your concrete will be rough and show the grain of the wood. I have here a sample of a residence built here in the city. The object of the architect in designing the building was to secure a rough finish. He wanted those little stones to show up from the outside of it. This was accomplished by taking the roughest kind of boards and we made a puddle clay and pasted this mud on the rough surface of the form about three-quarters of an inch deep, just as you would plaster an ordinary sand finish. Then in that clay a man placed these pebbles side by side. We found that it was necessary to place these pebbles far apart in order to get the artistic finish. Then the concrete was put in a mold. After the concrete had set the wooden form was taken away and the clay washed out, and with the result you see here. It is very inexpensive, by the way, no more expensive than a plaster finish.

Now we have spoken of what might be called the various operations constituting the manufacture of the concrete. A few examples may be interesting and I have been favored by some railroad friends with an exhibit here which I feel will particularly appeal to your judgment. It is an exhibit of a telltale pole for protecting railroad men on the cars from bridges, etc., with little strips hanging down. The chief engineer of the road which had this in operation has adopted it as a standard of construction and he told me he would not use anything else, that it is the most economical pole he has. And that was right down where they get the yellow pine poles from.

Another application for railroad purposes is bridges and conduits. That is such a common subject that I will not feel justified in taking up your time in talking about it. But I have photographs of a large bridge that are very interesting. That is a span of some 140 odd feet.

Another application of reinforced concrete to artificial foundations. Piles are the most interesting. We have had in Pittsburgh an exhibition of concrete piling on the South Side, and also at the Pennsylvania railroad at the Point, where concrete piles have been driven through the filled ground into the gravel underneath. I have some pictures here which I will circulate around the room.

Among other applications of reinforced concrete may be said to be shops and round-houses. There is hardly a person in the room who is not familiar with the P. & L. E. shops. Right close to the P. & L. E. shops is a reinforced concrete machine shop in which there is a crane in daily operation with a capacity of 60 tons, including dead load, at the rate of 350 feet a minute with a load of thirty tons. That is carried on a concrete girder on concrete columns 20 feet between centers. I think it is a very good illustration of the practicability of using reinforced concrete in railroad shops, round-houses, etc.

There is another application that I think will appeal to railroad people and that is its application to sand bins and coal bins. It is particularly advantageous in use there. The sulphur from the coal will destroy steel coal bins in a very short time. A friend of mine a short time ago built a wooden coal bin and it burned up. Then he built a structural steel bin. I think it lasted a year. Then he came to me to build him a concrete bin. That, he thought, would last indefinitely.

Another application that has been advocated by a great number of people is for railroad ties. The extent to which that has been applied I am not so familiar with. I understand that the L. S. & M. S. Ry. have a great many such ties in use.

Another application may be said to be telegraph poles. There is no reason why a reinforced concrete telegraph pole is not the best pole. It can be made strong enough, structurally speaking, and from an electrician's standpoint I suppose there is no reason why it should not be used.

Another application is to water tanks. It is very economical to make a concrete tank, but it can not be made by the ordinary shoveler, it requires an expert.

I will pass around the room a few examples of concrete structures.

The question of design of reinforced concrete structures I want to mention, because I think it is not generally understood that it is a simple process. There is nothing about the design of a reinforced structure that any engineer could question. I make this general statement without fear of contradiction, that there is not 5 per cent difference in the methods of design used by any of the prominent engineers in this country. That is pretty broad, but the basis of all designs is pretty nearly uniform, as far as the amount of steel is concerned. The other variations will be the value of your concrete in compression. In applying the various formulas it must be intelligently done. An arbitrary design of beam will not do. You have got to see what unit stresses you are using, etc. But I want to remove from your mind the idea that because it is a new subject it is a very complicated one, and because it brings into use the combination of steel and concrete in one composite structure that the ordinary man can not do it. I think every engineer can design reinforced concrete without any bother at all. There are times, however, when it is advisable to consult an expert, and those are special applications.

I thank you for your attention.

PRESIDENT: Mr. Cummings has kindly consented to answer any questions that may be asked, so we want you to feel free to raise any points that may suggest themselves.

I will ask Mr. Whited, Engineer of Bridges, city of Pittsburgh, to open the discussion.

MR. WILLIS WHITED: Mr. President and Gentlemen: The history of reinforced concrete has been rather peculiar. It has been used to a greater or less extent for upward of forty years. It was used at first for flower pots, sewer pipes, etc., which were required to resist a moderate internal pressure and to be water tight. Its use was gradually extended by people who had no realization of its real advantages, until Monier, Melan and one or two others took up the matter and applied more scientific methods to its use. Then G. A. Wayss, of Berlin, became interested and introduced it very widely in Germany and Austria. But it was about ten years ago that M. Hennebique began to introduce the system that bears his name. M. Hennebique is not a *very* thorough engineer, but he is a thorough business man. He advertised his system so widely and so skillfully that people began to investigate. Conscientious engineers who are charged with the expenditure of large sums of other people's money are loth to listen to the blandishments of agents, but owing largely to the advertising given to the subject by Wayss and Hennebique many competent, conscientious and disinterested men began to investigate the subject, both mathematically and experimentally, and to publish the results of their labors. The usefulness of reinforced concrete was established on a firm basis and now conservative engineers do not hesitate to use it in important structures. In fact, it has spread through the country like wild-fire. A very considerable proportion of the recent graduates in civil engineering are making a special study of reinforced concrete. Several college professors are making valuable investigations in this line, partly to ascertain the truth and partly, possibly, in some cases, to advertise their colleges as progressive institutions and good places to study reinforced concrete engineering. Many pages of the current technical periodicals are devoted to it. Four years ago, when I first became interested in the subject, I could not find a general treatise on it in the English language. I had to buy a French book. Now a new book on the subject is issued every few weeks.

It is wonderful the number and variety of structures that are built of this material now-a-days, and the veritable boom that is in progress is due, to a considerable degree, to the business ability shown by M. Hennebique in getting it before the public.

One of the reasons for the popularity of reinforced concrete and an indication of its usefulness may be expressed as follows: Structural steel, erected, costs in the neighborhood of $500 per cubic yard; the cost of concrete varies quite widely, according to circumstances, but will average not far from $8 per cubic yard, say 1-60 the cost of steel. Structural steel in compression will stand about twelve thousand pounds per square inch, concrete about 600, or 1-20 as much as steel, so that a dollar's worth of concrete will sustain in compression about three times as much as a dollar's worth of steel. In tension, on the contrary, steel will carry a load of about 12,000 pounds per square inch, while concrete will carry only about 50 pounds per square inch, or about 1-240 as much as steel. A dollar's worth of steel will sustain therefore about four times the load in tension that a dollar's worth of concrete will. Therefore, if a structure can be built in which the tensile stresses are resisted by steel and the compression stresses by concrete, an important economy can be effected unless the details are so expensive as to neutralize the intrinsic economy of the materials. Investigation will show that the percentage of what might be called waste material is, if anything, rather less than in the case of steel construction. On the other hand, steel weighs nearly four times as much per cubic yard as concrete, and as above stated, is about twenty times as strong in compression, so that the dead load of the concrete is at least five times as great as that of steel of equivalent strength in compression. It will then be seen that where the length of span is considerable, the greater dead weight of the concrete will neutralize its economy in cost. Another fact should be borne in mind, viz.: That the steel used in reinforced concrete structures is largely plain round bars, which cost much less erected than ordinary structural steel work.

In a girder, if the span is short, on account of the economy of the concrete, and the cheaper form of the steel, the saving in the use of reinforced concrete is considerable, but, as the span increases, the greater dead weight rapidly overcomes that saving.

In the case of the arch, as the material is nearly all in compression, the economy is greater than in the case of the girder, but this economy is partly neutralized by the greater cost of the centering required for a reinforced concrete arch. Moreover, as the span increases the greater dead weight of the concrete reduces the economy. In the case of short spans on the railroad, where the centering can usually be used repeatedly, the saving is quite marked, unless the abutments required to resist the thrust of the arch cost too much.

Reinforced concrete is more economical than stone for arches, because plain concrete is almost as strong as stone and much cheaper, and the centering is little if any more expensive. But if it is reinforced it is still cheaper, because, in the case of stone, it is necessary that the line of strain should fall within the middle third of the arch ring, in order to avoid any tensile stress, but if the concrete is reinforced, the reinforcement can be so placed as to resist any tensile stresses that may exist, so that no harm is done if the line of stress falls outside of the middle third, provided the maximum unit stress is not too great, and the arch ring can be made considerably thinner.

It will be found decidedly cheaper than stone, especially. On account of the reduced weight of the arch ring an important reduction can be made in the cost of the abutments.

Reinforced concrete has other important advantages. Its fire-proof properties are well known. Steel will not rust in a basic medium. As Portland cement is quite strongly basic and adheres very closely to steel, if the steel is completely covered with a concrete that is rich enough to prevent any considerable quantity of water coming in contact with it, it is thoroughly protected. Concrete moreover is proof against the sulphurous gases that are thrown out by locomotives, as well as against the various gases given off by sewage and the waste of manufactories. Iron rust is a hydrate of iron and occupies about four times as much space as the iron from which it is made. This increase of volume takes place with great force, sufficient, in fact, to break almost any concrete with which it may be surrounded, provided, of course, that the steel is everywhere in actual contact with the concrete. If, therefore, the steel should ever rust to a considerable extent, cracks would be pretty certain to show in the concrete.

There are some points in the design of reinforced concrete that are often overlooked by designers, and which it may be well to mention. Beams often fail by transverse shearing. The shearing stresses are sometimes resisted by short diagonal pieces as in Fig. 1 fastened to the longitudinal rods at the bottom; at the upper end they are often left straight, depending on their adhersion to the concrete to get the stress into them. It requires quite a considerable length of a bar imbedded in concrete to develope the full strength of the bar. Bearing this fact in mind, it will be seen that many reinforced concrete beams are built with inadequate provision for the transverse shearing stresses. Bending over the ends of the bars is not sufficient, because the concrete crushes in front of the hooks thus formed. They should be secured by nuts and washers or by some other means that will

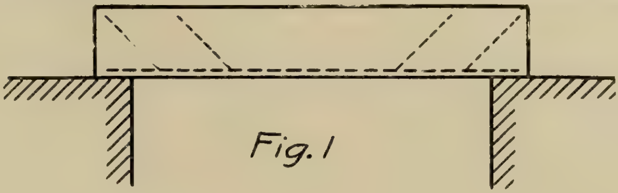

Fig. 1

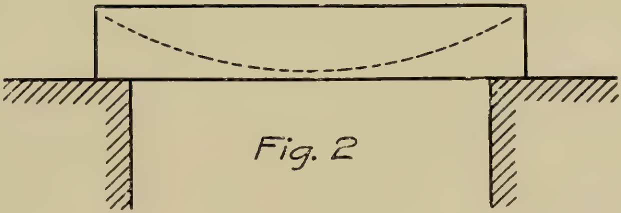

Fig. 2

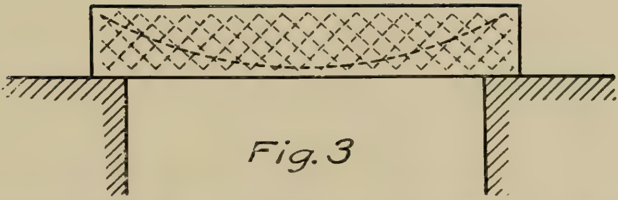

Fig. 3

afford ample bearing surface against the concrete, or they should be made enough longer to afford ample adhesion to the concrete.

The vertical shearing stresses are sometimes resisted by curving the main rods as in Fig. 2. This is a good arrangement if the load is fixed, but the rods should either be continued beyond the supports far enough to give sufficient adhesion, or nuts and washers or other secure fastening should be provided over the supports. If the load is a moving one, the varying shears should be provided for by diagonal rods somewhat as shown in Fig. 3, in the form of woven wire, expanded metal or other similar construction.

Reinforced concrete is often used for columns. In that case it is better to let the concrete resist all the compressive stress, using the steel only to hold the concrete in place; or, if the column is long in proportion to its diameter, to resist any bending stresses that may exist. A column made of a brittle substance like stone tends to fail by shearing at an angle of about forty-five degrees with its axis, and the steel in a reinforced concrete column should be distributed with a view towards resisting that tendency. Any solid under compression exerts a force at right angles to the line of pressure, which bears a certain ratio to that pressure, depending on the nature of the material of which the body is composed. That ratio may be called the co-efficient of viscosity. The amount of pressure that a given confined solid will sustain is at least as great as the resistance offered to its lateral expansion multiplied by its co-efficient of viscosity. This is somewhat abstruse. It may be illustrated as follows: A plunger in a hydraulic cylinder will sustain any load that can be placed upon it that is not sufficient to burst the cylinder. The lateral pressure per square inch of the water in the cylinder is equal to the pressure per square inch exerted on the plunger, neglecting the weight of the water itself. The co-efficient of viscosity of water is equal to unity. If loose earth be substituted for the water the pressure exerted per square inch on the sides of the cylinder will be much less than that on the plunger, owing to the friction between the particles of earth; that is, the co-efficient of viscosity is much greater than unity. If the cylinder is completely filled with a solid, concrete for example, the co-efficient of viscosity is further augmented by the cohesion between the particles of the concrete.

Now, if a concrete column be reinforced with steel, so distributed as to resist its tendency to expand laterally when subjected to a longitudinal pressure, the strength of the column will be limited only by the strength of the reinforcement.

I do not know that anybody has ever determined the co-efficient of viscosity of concrete, but it is evidently quite large. In designing columns reinforced in this way it must be borne in mind that steel is tougher than concrete, and before the lateral pressure transmitted by the concrete reaches nearly up to its elastic limit, the reinforcement may yield sufficiently to permit the concrete to be disintegrated.

M. Considere has performed many experiments with concrete columns reinforced somewhat after the manner here discussed. It is possible that the co-efficient of viscosity of concrete can be determined from his experiments, but I have not had time to study them over thoroughly.

PRESIDENT: May we hear from Mr. Morse. I believe he can tell us how we can produce cheap material.

MR. E. K. MORSE: I think that you have heard enough of the scientific part of the discussion. I thoroughly agree that we have been going a little too fast. Everybody seems to be daft on the subject; everyone wants to dabble with it, and a good many are going to get their fingers badly burned. We have had all over the country some very sad examples of its careless use. The use of concrete—not reinforced—is one of the easiest things that we have to deal with. It is one of the easiest things to make a poor job out of. The introduction of machines for mixing is one of the blessings we have had since the introduction of Portland cement in this country. Back in 1895 was about the beginning of the free and intelligent use of Portland cement, made entirely in this country; today we are exporting it.

Mr. Cummings is right in one sense that we have to test our cement. That is proper in all materials of construction. I will however venture to differ with him in this respect, that there are a good many makers of cement in this country today that are making material that it is almost safe to use without inspection. But it is a very good safeguard to have a testing machine around a job anyway.

We have only to go back ten years in this vicinity to reach the time when reinforced concrete commenced to be used extensively. The first pier I built in 1896 down at Rochester was a stone shell pier filled with concrete. Today we do not think of building any other kinds, and we get a cheaper bridge and save dollars and cents—which appeals to the man who puts up the money. For its commercial value it will earn just as much money, and that being the case the engineer has no right to carry on his own private wishes or experiments in making it a little better than is necessary. The time to quit is when the complete efficiency is obtained and when a structure is homogenous throughout. Any expenditure beyond that is pure extravagance and seldom called for.

The use of reinforced concrete has a valuable function to fill. Many in this room can recollect when our forests were standing on all sides, great white pine, such as no state in the Union can excell. Where are the forests today? Where are the poplar and oak forests that were over in the edge of Ohio in Mahoning county, my home? There is just one poplar left where we used to cut them by hundreds, and oaks five or six feet over cannot be found at all. The introduction of reinforced concrete is most opportune. The time has come when it will take the place of a great deal of our timber uses in construction. I believe the time is ripe now when our private homes will be built with much of the internal work of reinforced concrete. But do not understand me to say use it freely. I am bitterly opposed to its indiscriminate use. It is most carelessly used today.

Mr. Cummings said we had very poor sand and gravel. I agree with him if he takes it out of the Monongahela river. The fine silt that comes from the coal banks along the river is something enormous. It is held in our pools and dredged out and goes into the barges as sand. It is mighty bad sand for good concrete and wholly unworthy to use in reinforced concrete—for reinforced concrete is a refined material as compared with the ordinary use of concrete. We have not so many coal banks on the Allegheny river, we have not the pools and we have not the sluggish current. The result is we have a very much better product out of the Allegheny river. It is the function of the engineer to specify his material where he can get it best.

Another subject where Mr. Cummings touched pretty lively on the civil engineer, is that it is the duty of the engineer to make the mix apparently that is pretty economical for the contractor to handle. The more sand you get into it the cheaper it is to mix. He did not say that, but that is what a good many contractors mean. I differ from him. If I do not spend the employer's money to the best possible advantage I have been ignorant or derelict or both. I put in one year something like 500,000 yards of concrete mixed 1, 4 and 12 all down under ground. A certain friend of mine went to the head office and said you could blow through it, it will not hold water. Well, I agree with him, it was not designed for water-proof concrete. Do any of you suppose that 1, 3 and 6 is as cheap as 1, 4 and 12, when the 12 is gravel and the 4 is sand and costs about 2½ cents a bushel and cement then was $2.10 a barrel? The cement is what costs; the labor comes next. The introduction of machinery cuts the mason out and the labor cost is coming down. There is no trust in cement, but there is a very happy feeling I understand.

That same friend that went to the head office had to replace some of this foundation and extend the superstructure, and he invited some of his friends to come and see him dig it out. He did not tell me anything about it. He put in some Italians and they went at it. They could not dig it out as expected, and he had to blast it out. When he came to put in his own foundation the head office told him to make it 1, 4 and 12, just the same as I had adopted. That was not because my product was the best that could be put in, but it was all that was required for the conditions, and it cost but $4.10 a yard. It has been my habit and will continue to be my policy to make my specifications suit the occasion. There is no sense in spending more money than the commercial value of the work demands. If you are building a water-proof tank you had better make it 1, 2 and 4, but if you are filling a great hole in the ground then cut the cloth according to requirements.

There is one thing in reference to reinforced concrete that has not been mentioned, namely, do not allow the steel or iron that goes into the concrete to be painted, for this reason: Cement has a greater affinity for iron or steel than it has for itself. With paint on you cannot get a bond. That being the case, you have left a coating around that metal that is an invitation for the introduction of water.

PRESIDENT: We would like to hear from Mr. Swensson, the consulting engineer.

MR. EMIL SWENSSON: Mr. Chairman and Gentlemen: I suppose it will be my duty to take the third side in this argument on quality or grades of concrete, which has just taken place between Mr. Cummings and Mr. Morse. Mr. Cummings is right and so is Mr. Morse; however, with this difference, that Mr. Cummings was dealing with a high grade concrete, such as is used for reinforced concrete in buildings, while Mr. Morse was talking about simple foundation concrete, same being confined by the earth. Mr. Morse in his remarks evidently forgot that all engineers are not as conscientious with their clients' money, or in the quality of the work designed or executed, as he and Mr. Cummings are. Unfortunately there are the other kinds of engineers, some of whom should not be classed in the profession; and we have some very sorrowful examples of their questionable work throughout the United States, especially so in reinforced concrete construction. Such reckless designing and poor construction alluded to, has become so prevalent in the last few years that the important societies or associations of engineers and others have become alarmed, lest more serious accidents than have occurred would be the order of the day. Thus the American Society of Civil Engineers as early as 1903 took official notice of the matter, and in 1904 a special committee, to report upon concrete and reinforced concrete, was appointed, with instructions to co-operate with similar committees from other societies, such as the American Society for Testing Materials, the American Railway Engineering and Maintenance of Way Association and the Association of American Portland Cement Manufacturers; the latter being especially vitally interested in the matter, as in case of failure of concrete or reinforced concrete structures, it seems to be natural to blame the cement rather than the design or construction.

The above mentioned societies formed themselves into a joint committee, which has now been at work for nearly two years. The object of this committee is to study, test and standardize concrete and reinforced concrete in structural members, and finally to deduce formulae for the correct design of structures and structural members in same. Last year quite a lot of work was done in the testing line at a number of college laboratories and also in some private laboratories. However, when studying and attempting to draw conclusions from such tests, it was found that they had the same defects as previous tests made by private parties interested in the subject, both here and in Europe, namely, that they were too specialized and too much affected by the personal equation to serve as a basis for comparative investigation and scientific deductions; besides, none of the investigations recorded had started with the necessary ground investigation of the concrete itself and its ingredients. It has, therefore, been found necessary for the committee to start on another track, and it has now enlisted the United States Government in its work. The moment was especially opportune, as the Government, through its Geological Survey, had become possessed of the physical laboratories erected at the St. Louis Exposition for the exhibition of the testing of fuels and cement, and later on, materials of construction. There the Government will make an extended series of tests, in accordance with suggestions laid down by a special committee of engineer-representatives from various societies and railroads, etc., called in by the Government, but in accordance with schedules and rules laid down by the Joint Committee above mentioned. These series of investigations and tests will start at the foundation of concrete, namely, its ingredients, establish various standards for same ,and also for the concrete itself and reinforced concrete, which can be a guide to the engineers throughout the country, enabling them to know what value to put on the concrete they make from materials nearest at hand to the place of work for which they have designed. The Joint Committee will then make the necessary study and deductions for suitable formulae, to be used in designing structures of concrete and reinforced concrete, based upon the various standards.

These tests are expected to take about four or five years for completion and will represent an expenditure of about $125,000. The importance of the subject not only warrants but requires such expensive investigation; in fact, in Europe, particularly in Germany, by the German Government, much more elaborate investigations are now being made by a special department of its own and at a very large expense.

Referring to the figures that Mr. Whited put on the paper attached to the wall, I do not believe that he explained them fully, or at least the impression he gave me is somewhat erroneous, as he did not carry his deductions far enough. He put down the value of steel in compression as 12,000 pounds per square inch, and concrete 600 pounds. The tensile strength of steel he put down at 10,000 pounds per square inch and for concrete 50 pounds. Further, he put down the value of a cubic yard of steel at $500 and of concrete at $8, and from his remarks I was lead to believe that concrete construction was thereby proven as very much more economical than steel, that is, in buildings. He stopped there. If he had carried his reasonings a little farther he would have probably given us an entirely different impression. If steel is worth twenty times more than concrete when in compression, and two hundred times more when in tension, and in dollars and cents steel is worth sixty times as much as concrete per cubic contents, the inference, of course, is that the concrete has a vast advantage. This is, of course, very true in a case where the materials, concrete and steel, are in compression, when you compare sixty with twenty; but when you compare sixty with two hundred, that is when the materials are in tension, the conclusions are really the other way, and inasmuch as in engineering structures the tension strains play a much larger role than compression strains, the evidence is conclusive that steel is more economical than concrete when so used and that is really the reason why we have been obliged to come to the reinforced concrete construction, namely, reinforced with steel to take up the tension strains. Look at our beams, girders, floor-slabs and columns in our sky-scrapers, where in every member the tensile strains are the important ones for consideration.

However, such a table as Mr. Whited gave us does not tell the whole tale, as to the relative merits of steel and concrete. There are many other conditions that must be taken into consideration when studying this matter, which was my only desire in calling attention to this table.

Now, as to the various samples of materials which Mr. Cummings has put before us on the table, I wish to call attention to the fact that the Joint Committee, above spoken of, first coined the name Mr. Cummings gave to these bars, namely, "deformed bars." I think that is a very good name, as it more fully describes it than any other name; besides, it is very appropriate for various other reasons. Mr. Cummings made the statement that reinforced concrete is theoretically a very simple matter, and so it is; but many investigators, especially professors, have made it seem very difficult, by going into minute and hair-fine deductions, based upon various experiments that did not start out with a rational reasoning. Take, for example ,the simple beam, and first consider same as not being reinforced, but only made of concrete. Everybody knows that such beam is very limited in strength, on account of the low tensile strength per square inch of the concrete. To use the concrete beam something must be done to increase its value in tension ,mainly on the bottom. This is done by introducing steel in some form or other in the line where the tensile strains occur—the amount of such necessary steel can not be ascertained by mere guessing—and then find the value of the beam reinforced with an arbitrary amount of steel. The simplest reasoning is as follows: 1. Ascertain the value of the concrete in compression at its ultimate strength; 2. Ignore the value of concrete in tension, as it is so small; and 3. Introduce sufficient steel to, within its elastic limit, just balance the value of the concrete in compression; and we will have a balanced beam. There are, of course, other tensile strains that should be taken care of, but the above is the most important.

From the above reasoning you will not that our first consideration should be—what is the value of our concrete? Such value is rather uncertain and very variable, due to different grades or classes of concrete. The steel is well enough known at the present day not to give us much concern; but, unfortunately, most investigators are more concerned about the steel and worry about steel of different elastic limit, and also about slight variations, always permissible in steel structures, or 8% in ultimate strength or 4% in elastic limit. The question of high or low tensile strength steel is not scientific in any way in connection with reinforced concrete, but only a question of economy. The designer whose pocket-book is interested in the matter in all likelihood is the sole responsible party for the introduction of theories about high tensile steel. This matter of high tensile steel has been very unfortunate for the reinforced concrete structures in the United States, as this has led to another inevitable fallacy, namely, the "deformed bars."

Speaking in general, it so happens that when you put in enough sectional area of ordinary steel, say 64,000 pounds ultimate, plain round or square bars give sufficient surface for the needed adhesion between the concrete and steel. When the high tensile steel is introduced, the section of material is consequently reduced, less pounds of steel are used, and periphery or surface of steel is also reduced, consequently reducing the adhesion. To overcome this, the aforesaid economically inclined gentlemen have devised various kinds of deformed bars.

Now, as to the fallacy of these deformed bars giving sufficient adhesion between the concrete and the bars, it stands to reason that between the shoulders or other deformations on the bars, where the section or periphery is too small, the concrete will slip and cracks are produced before the shoulders will come into play and stop the slipping. That being the case, the adhesion is already ruined, and what is more, the concrete is ruined; and we do not have reinforced concrete, but instead a mechanical device or combination of concrete beams and tension rods, the concrete being already seriously damaged. In Europe deformed bars are not in use, the round bars, as giving the best adhesive surface, as well as gripping condition at the time of the shrinking of concrete, are mostly used. So is the case also in very large enterprises in this country, where lots of reinforced concrete is used, such as the New York Subway and on some of our largest railroads.

Now, as to the supposed economy resulting from the deformed bars, same is not as much as first indicated, because, although less pounds of steel may be used with high tensile deformed bars, the price of such steel is so much higher than the ordinary round steel that can be obtained at any time and very quickly at that. This supposed economy would be very materially reduced if the manufacturers of high tensile steel deformed bars had fully appreciated the saving in cost of the introduction of such deformed bars and charged the price per pound that they should have charged. When the manufacturers of such deformed bars understand the situation, I fully believe that the price for same will be so raised that it will be equally well to use the round bars of ordinary steel, even from an effort to economize; and, of course, the reinforced concrete used will be much better, as there will be no cracking of the concrete at intermediate points nor crushing at the shoulders of the deformed bars.

To finish up, I fully believe that the investigations and study of the above mentioned committee and the work done under its direction at the Government Laboratory will develop and fully determine what is the most scientific construction of concrete and reinforced concrete, and also where the danger limits are in such designs and constructions.

From my acquaintance among the engineers in our city I am pleased to say that we have engineers who now practice the designing and constructing of reinforced concrete, and many more who will do so in a conscientious and scientific manner.

I thank you, gentlemen.

PRESIDENT: Mr. Barnsley, may we hear from you?

MR. GEO. T. BARNSLEY: Mr. President, I think I had better make a motion to adjourn. To say anything would remind me of a fire works display on the 4th of July. A little boy got out all his friends, and first he had the heavy fire works, the bright stars, the spinning wheels, the cannon crackers and a mine. Then the spectators thought it was all over. But he found that he had a little squib left and he wanted a match to light that. Now, if I am to be a squib tonight and make a little sputter, I will make it short.

I notice one thing in this question that the gentlemen have not dwelt much upon, the use of concrete as a matter of necessity. I think we all realize that concrete and reinforced concrete is to a great extent a matter of necessity because of the scarcity of material. When you go into a country all the good timber is taken out first, and the good stone ,and then you are scratching around later on for the poorer material. In the case of concrete you can utilize the remnants of the good materials, whatever is left, and with the use of cement and sand you are making masonry which is as good as that made by the fine basic stone. The manipulators of concrete are becoming so expert as to leave the structure quite artistic. Probably in a little while it will be made as much so as the rock faced masonry. There is no doubt that as a comparative measure under certain conditions the concrete is made more cheaply than stone because the days of rebates are coming to an end, and when you transport those materials a long distance you are running up against expense. Concrete can be made under many conditions very cheaply as compared with stone masonry.

This refuse that I mention will in turn become scarce and the introduction of steel as a reinforcement will enable your cross section to be made smaller and your yardage less, and yet you obtain the desired result. So it strikes me that it is a matter of evolution. Certain material becomes scarce and you look around for other combinations. As you are developing, you are looking for the commercial point, which is of great necessity in the building of works of any character.

MR. R. P. FORSBURG: It was my pleasure thirteen years ago to be associated with Mr. Cummings in the engineering department of the Northwestern Railroad, and as a former associate I desire to present to the Chair a motion to thank Mr. Cummings for the very able paper he has presented this evening.

The motion prevailed unanimously.

MR. CUMMINGS: In reply to the remarks that have been made this evening, I think Mr. Swensson satisfactorily answered Mr. Morse's criticism. With regard to what Mr. Whited said, I think he amplified my remarks in regard to designing of beams. I did not feel altogether justified in going into the full details, expert details of construction. Being engaged in the manufacturing business myself I have a hobby.

In regard to the remarks of Mr. Barnsley, I think he has hit the nail on the head when he says the subject is a sort of evolution. Reinforced concrete has come to stay. Its existence is assured by the fact that it is economical and the most satisfactory material for structural purposes. That it will take the place of structural steel in office buildings is a matter of development for the future. That it will be used by railroads more extensively is my unquestioned conviction. I think railroad people have used it in their work along the river here and the railroads are using it. We have in this city a Little Giant. We have also a Big Giant. The Little Giant is using it and the Big Giant is using it. And I think that being the case there is no necessity for apology.

I thank you all for your attention.

ON MOTION, adjourned.

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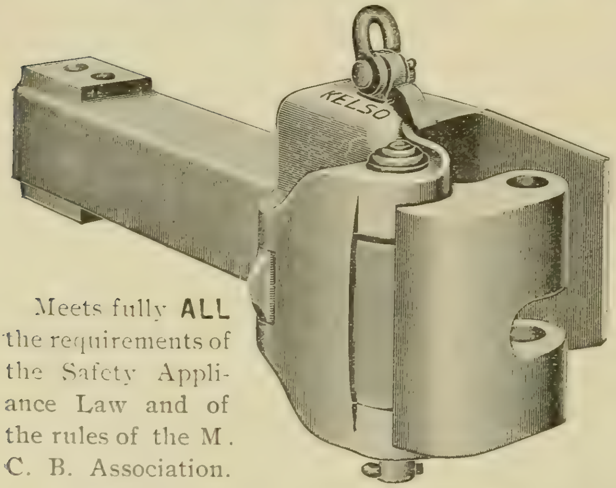

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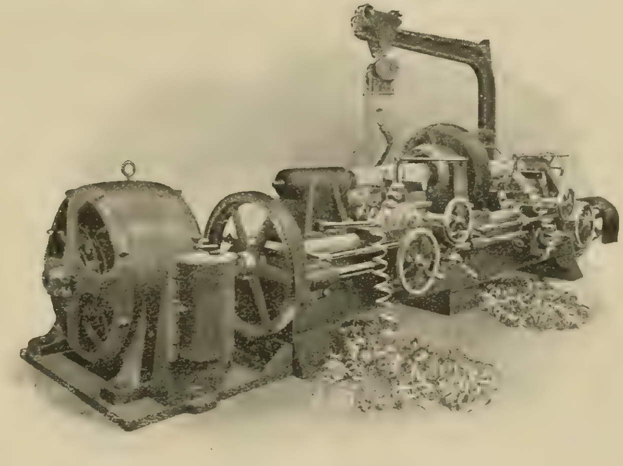

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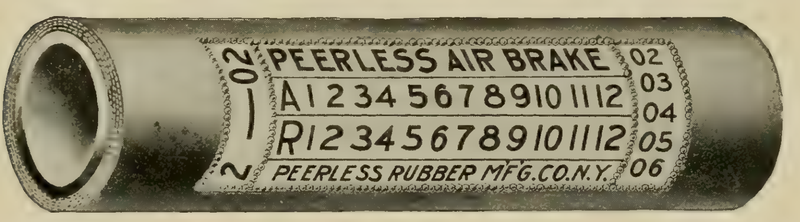
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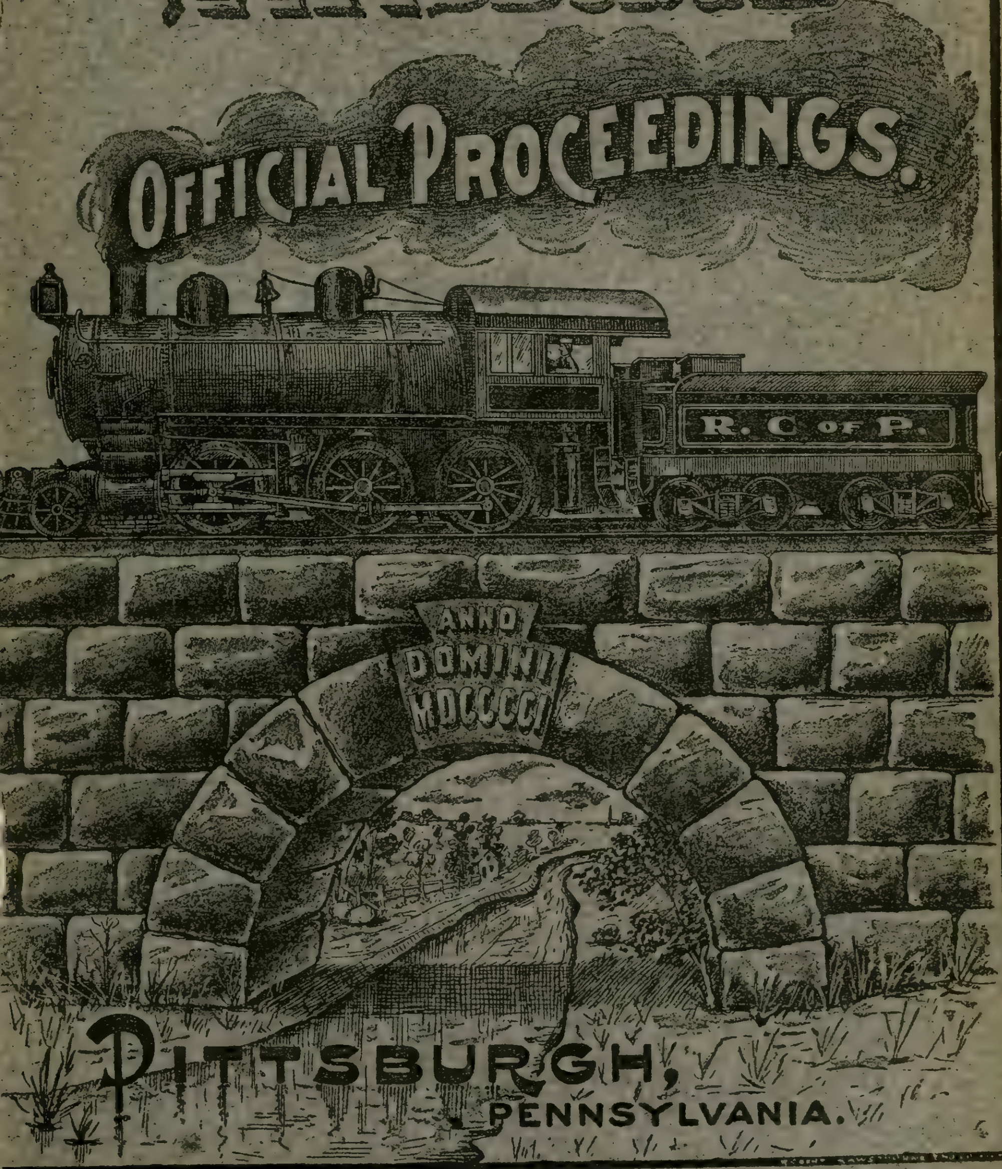

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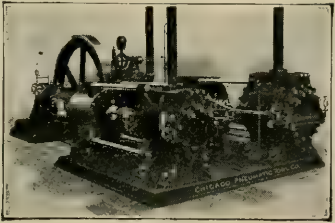

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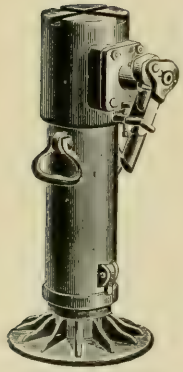

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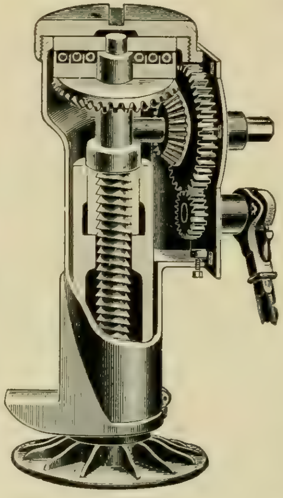

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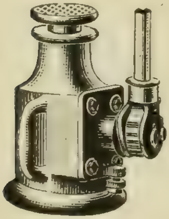

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of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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VOL. V.
No. 5.

Pittsburgh, Pa., Mar. 23, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

MARCH 23rd, 1906.

The meeting was called to order at 8:00 o'clock P. M. at the Monongahela House, Pittsburgh, Pa., with President F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Allen, Harvey J.
Barwis, J. McC.
Bihler, L. C.
Brand, Thos.
Branson, C. R.
Brown, A. D.
Brown, E. W.
Brown, Geo. P.
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Coursin, J. F.
Courtney, D. C.
Cox, P. L.
Crouch, A. W.
Curtis, H. C.
Dambach, C. O.
Davis, G. H.
Dow, G. N.
Drayer, U. S.
Elder, Thos. W., Jr.
Elliot, A. H.
Gardner, H.
Gearhart, J. A.
Haring, Ellsworth.
Haynes, J. E.
Hetherington, S. C.
Hirsch, Wm. L.
Horner, H. G.
Huckel, John.
Jacob, W. W.
Jaggard, H. A.
Jennings, F. R.
Kelly, Moore.
Kerschner, Robt. L.
Kessler, D. D.
Kirk, T. S.
Kissinger, C. F.
Kleine, R. L.
Knight, E. A.
Koch, F.
Korba, W. J.
Krause, Julius.
Lace, Thos. C.
Lanning, J. Frank.
Lobez, P. L.
Long, R. M.
Millar, Clarence W.
Miller, F. L.
Milligan, John D.
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Murphy, W. J.
McCartney, J. L.
McDonnell, F. V.
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McKee, F. E.
McKee, S. Frank.
Oates, Geo. M.
Obey, G. B.
Peach, W. M.
Peacock, W. W.
Phelps, W. H., Jr.
Platt, A. T.
Porter, H. V.
Quest, W. O.
Redding, D. J.
Reeve, F. J.

Ryan, Wm. F.
Sanville, W. F.
Sattley, E. C.
Schomberg, W. L.
Shaler, Fred J.
Shaw, O. M.
Shuck, William C.
Slocum, A. W.
Smith, D. W.
Spangler, C. P.
Stafford, B. E. D.
Stafford, Sam'l. G.
Stark, F. H.
Stewart, Wm. W.
Stucki, A.
Suckfield, G. A.
Sweeley, G. P.
Tate, Ralph H.
Tesseyman, J. E.
Townsend, T. E.
Wallace, M. E.
Walters, T. J.
Warne, J. C.
Warner, E. O.
Weisbrod, J. F.
Winlo, R. C.
Zelch, J. L.

VISITORS.

Alleman, C. W.
Baker, Jas. H.
Bishop, J. B.
Bishop, P. E.
Blackford, F. G.
Bollinger, Grant.
Bowes, Geo. L.
Carpenter, C. V.
Christianson, A.
Conneely, E. K.
Dempcy, R. H.
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Gibson, Chas.
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Patterson, W. K.
Patterson, S. H.
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Schomberg, F. L.
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Shuff, Wm. J.
Speller, F. N.
Stapel, Wm. J.
Steward, G. M.
Stewart, Homer L.
Stone, C. E.
Tonner, E. A.
Watson, E. A.
Way, L. A.
Young, Robt.

PRESIDENT: The minutes of the last meeting being in the hands of the printer, if there are no objections the reading of them will be dispensed with?

Secretary Conway read the following list of applicants for membership:

Bell, T. H., M. M., N. Y. & C. Gas Coal Co., Turtle Creek, Pa.

Blackford, F. G., Mgr. Paint Dep't., Bindley Hardware Co., Idaho Apts., Pittsburgh, Pa.

Borton, A. W., Borton-Tierney Co., Stephen-Girard Bldg., Philadelphia, Pa.

Conneely, E. K., C. C. to P. A., P. & L. E. R. R. Co., Pittsburgh, Pa.

Davidson, W. H., Chief Clerk to Gen'l. Yard Master, B. & O. R. R. Co., 201 E. Division St., New Castle, Pa.

Dix, John W., Salesman, Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

Gorby, F. E., C. C., B. & O. R. R. Co., New Castle, Pa.

Gormley, Chas. H., G. Y. M., Penna. Company, No. 119 North Walnut St., New Castle, Pa.

Graham, Chas. J., Secy., Graham Nut Company, 400 Atlantic Ave., Pittsburgh, Pa.

Hipple, H. M., Special Agt., P. R. R. Company, Union Station, Pittsburgh, Pa.

Mavis, J. A., Store Keeper, Pittsburgh Coal Company, Coraopolis, Pa.

Neale, John C., Asst. Genl. Mgr. of Sales, Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

Nessle, J. B., Gen'l Agt., P. & L. E. R. R. Co., General Office, Pittsburgh, Pa.

Patterson, S. H., Foreman, Pittsburgh Coal Co., 528 Morrow Ave., Carnegie, Pa.

Perry, C. V., Gen'l. Car Foreman, B. & O. R. R. Co., No. 7 Belmont Ave., New Castle, Pa.

Plunkett, Thos., Rep., Revere Rubber Company, Boston, Mass.

Shadle, Clinton F., Ass't. Sup't. Signals, P. R. R. Company, Union Station, Pittsburgh.

Speller, Frank N., Metallurgical Engineer, National Tube Company, Frick Bldg., Pittsburgh.

Tibbals, S. B., Foreman, Pittsburgh Coal Co., Coraopolis, Pa.

Tonner, E. A., Car Foreman, Pittsburgh Coal Company, Coraopolis, Pa.

Wolfersberger, S. C., Train Master, B. & O. R. R. Co., 153 Crawford Ave., New Castle, Pa.

Ward, Edw. J., Rep., Philip Carey Mfg. Co., 433 First Avenue, Pittsburgh, Pa.

Burrell, J. E., Chief Clerk to Gen'l Agt., Penna. R. R. Co., Union Station, Pittsburgh, Pa.

PRESIDENT: As the hour is somewhat late we will immediately take up the subject for the evening. By way of explanation I may say that this subject did not originate with the Committee, but was suggested by a representative of the railroads, and after considering it we concluded to have it presented. In looking around for some one to present the paper we considered that Mr. Thomas Lace was well equipped, having traveled a great deal in the employ of the government and being a very well read man. It gives me great pleasure to introduce to you Mr. Thomas Lace.

Uses of Steel versus Wrought Iron.

BY MR. THOMAS LACE, FOREMAN BLACKSMITH,
PITTSBURG COAL CO.

Mr. President, Officers and Fellow Members:

The subject matter here presented is non-scientific, and in this and other respects it differs from the contributions commonly placed before this assemblage. The purpose or intent is to place the subject before you, with a view to calling out further and more able discussion.

Steel is not easy to define. The late Mr. Alexander Holley quotes it thus: "An alloy of iron cast while in a fluid state producing a malleable ingot." This definition will serve to distinguish it from cast iron on the one hand, and from wrought iron on the other.

Cast iron is not malleable, but crumbles to pieces after being heated and struck by the hammer, and wrought iron is produced, though malleable as a pasty mass, the temperature of an ordinary furnace being insufficient to melt it.

Wrought iron is more fibrous than mild steel, and it contains from the method of its manufacture an average of 3% by weight or 7% by volume of slag dispersed through its mass, which detracts from its strength.

On the other hand, the process of fusion in the manufacture of mild steel eliminates all traces of slag. This is a great advantage as regards homogenity and strength.

Old definitions of steel held that there was a larger proportion of carbon in steel than wrought iron, but this does not hold good at the present time when some of the mild steels contain no more carbon than some wrought iron.

Armstrong states that steel is iron produced by fusion, instead of a process of adhesion, and in that case it is entirely independent of any particular sense of carborization. Using the term in this sense, steel has the advantage over iron in being free from the defects in welding, and generally contains more carbon than wrought iron. Tis renders steel stronger. Steel is also tougher under certain tests, but more prone to fracture under others.

The manufacture of steel continues to improve, while that of iron is stationary, and the manufacture of iron as now practiced will entirely merge into that of steel, as produced by the process of fusion. Commercial malleable iron is always made by the puddling process, and is soft, tough, almost infusable, but can be readily welded at a white heat, but on the other hand small quantities of various metals and elements exert a very marked difference in the quality of the metal, and involves some of the refinements of analytical chemistry.

The iron worked up by smiths in mediæval times was produced by a process akin to the puddled steel process, and was almost identical with the material used at the present time under the names of ingot metal or soft steel. We need not enumerate the forgings of that period, many of which are in existence at the present time, but will say that to duplicate these forgings with puddled bar would be impossible, even with the assistance of Tubal Cain of holy writ thrown in.

The decadence of wrought iron can be readily traced from A. D. 1784. At that period Cort introduced the puddling furnace, and we believe, the rolling mill into England. Quantity began to take the place of quality, as an inferior iron or rather a more impure iron could be made by this process, than by the old open forge process. The use of charcoal in blast furnaces at and about that time probably delayed the downward course of iron as regards quality. Iron received additional help to reach its present status by the introduction of the hot blast by Neilson A. D. 1828, and the general use of coke instead of charcoal in the process of smelting and refining.

From this period we can say with little fear of contradiction that iron began to take on its modern characteristic, i. e., lack of homeogenity. Charcoal iron, however, held its place in America long after its manufacture in England had been virtually abandoned for general purposes.

At this period small and medium forgings were usually made from either charcoal Swedish or Norway iron, and the scrap resulting from the manufacture was piled and worked up for heavy forgings, making a first-class forging. The specifications are followed in our day as given at that date, namely, make of first-class or selected scrap a certain size over drawing if machine work is entailed, and to be executed free from flaws and finished in a workmanlike manner. At the present time the letter is followed, but the quality of the scrap has deteriorated; for instance, we have in a pile red short, cold short and double refined iron, also mild steel of various qualities with their various oxides, the whole making a conglomerate cemented or not cemented by dirt at their various points of welding.

As previously observed, small quantities of various metals or metalloids change the properties of other metals even when fused together; for instance, the effect of phosphorus or sulphur upon iron. Therefore, how can we hope that a Mosaic made after this manner will give good service or stand rough usage.

Iron as made by the puddling process served its purpose in the early days of railroads and steam navigation, and is held up in some quarters at the present time.

May we venture the question as to what would be thought of constructing locomotive boilers, rails, bridges, wire rope and a legion of articles made at present from steel, were we to go back to iron, without counting steel cars. Take for instance the main and side rods on an up-to-date locomotive, with the crank pins, piston rods, and often centers of wheels. Are these articles placed in service on account of their wearing qualities or not? The steel exale is also here to stay, and so is the wire nail.

Railroad corporations are conservative as a rule, and have kept well up to their traditions in the use of mild steel, and with a fair reason.

One railroad which enters Pittsburg adopted steel to replace iron in 1895 or 1896. The large sizes were unweldable and there was no difficulty in cutting or breaking a bar cold 3 in. o downwards to 1½ in. o, nicked once round and the severance completed by a few blows of a 14-lb. sledge. The small sizes were better as regards strength, but required much more care than iron in heating for welding. We cannot say what the specifications called for in grade, process or quality, but are quite sure that it was as a whole unfit for railroad work. The same corporation also ordered a certain number of low moor iron axles and about two tons of 8 in. and 9 in. round iron of the same quality for crank pins. We may remark that the iron in question was imported, and the cost was from $160.00 to $200.00 per ton, short.

In service the axles did not give as good service as steel, and several of the crank pins flawed in the case hardening process which they were subjected to. All required to be ground to shape as through the mode of manufacture, viz., slab welding, they took an oval shape in cooling. The instance referred to is given to show that a superior grade of iron is not equal to the average mild steel.

We will all remember the time when iron was used for side and main rods, and the periodical inspection for flaws about every three monthsi. For the uninitiated we give the process: One end of the rod being secured the remained was bent in or to an arc, and while in this position oiled waste was passed over the curved outline, the rod was then released, and regaining its normal shape thereby expelling the oil from any flaw, this formed a line at right angles to the rod. A lense was also used for this purpose. This is not ancient history, but a few years back of this enlightened epoch.

We can imagine one of the rods H section used on the modern locomotive treated thus, but they do not require testing at this time, chemical and hpysical tests have been made before the rod was manufactured. Prejudice on the part of many interested persons, lack of knowledge in the manufacture or properties of steel, with also reference to some of its failures such as occurred when used at first in the manufacture of boilers, defects in flanging, and in shafting for steam vessels gave good reason for this, also the difficulty encountered in making complicated forgings an idea was prevalent that steel was more difficult to machine than iron. This may be true as regards railroad tires, where the metal has been in rolling contact and has been compressed, but is not the case with ordinary metal; it is in fact much cleaner, and a broom is not required to clean the dirt from a machine that is doing heavy cutting. Forgings that are to be machined do not require the close margin of finish formerly demanded in ancient times by the use of carbon steel tools of ordinary quality. The advent of high speed steel has rung the knell of all close forging, and what with milling machines, heavy lathes and planers, saws, twist drills, etc., steel is cut as readily if not as rapidly as wood.

Malleable cast iron served in many instances to take the place of iron forgings of a complicated shape, but will be superseded by steel castings for heavy work. Complicated forgings will be and are obsolete for braces, frame pads, rockers and other purposes. As to engine frames, we believe that many of the failures have arisen through a lack of consideration as to expansion and contraction in the manufacture. This is laid down upon well known lines up to a red heat, but above this and up to fluid state, it is not easily defined, on account of the gases which permeate the molten metal.

Now at the moment of consolidation or setting the metal in the spaces of the top or back of the frame and the lower rails must draw from the pedestals, causing the atoms to be in the very reverse of what would take place in a forging or in a casting made by the Whitworth process; in other words, the atoms are moved to the limit of their attraction for each other.

To bear out this statement notice the porosity of an ingot. Before it is hammered or rolled a certain amount is cut off by specification for certain classes of work, such as ordinance, etc. We have noticed one frame that was broken before the engine was placed in service, and in the center of the break a cavity ½x9 in. in length. Now to overcome the initial weakness of the casting, pressure must be resorted to, either by the Whitworth process, rolling pressure, or the last and worst, the steam hammer. By the foregoing conclusions it is obvious that the closer the atoms that enter into the composition of steel approach to each other, so will be its resistance to all strains. This is subject to composition and heat treatment.

One more observation as regards the loose state of certain parts of the ingot. Should this be rolled into billets for the manufacture of tubes or plates, the cavities are brought together by pressure but make themselves knowl as laminations or pits or blisters when placed in service as boiler tubes or fire box plates. As regards the latter the general consensus of opinion leans to open hearth steel. We have seen charcoal iron and copper in this service, but believe that a mild crucible steel would be worth a trial for this purpose, reasons as given.

We have noticed that the steel generally used in fire box construction occasionally fractures when placed in service. The defects in iron fire box plates were laminations, and in steel are similar, being caused by blow holes in the ingot, which when rolled produce laminations in steel. These defects are sometimes concealed by the process of rolling, and the glaze produced to give a black finish for appearance sake, which all will admit hardens to some extent similar to hammer hardening. The plate is then cut to shape and the flanger in a repair railroad shop flanges it by the aid of a forge and sledge hammers or mallets.

We will not offer an opinion as to whether this leaves a strain on the material. The plate is next punched. We all know this leaves a strain as shown in sample. The process of annealing follows and is in many instances a matter of form, where there are no furnaces large enough to admit the plate. It is next placed in position and corrected to shape by blows, bolting and drifting. The stay bolt holes are cut to threads or bruised according to the tools used and the stay bolt inserted, the ends cut off and burred by several smart blows, which strain the holes on the principle of a hydraulic plunger. When the fire is lighted a crack often results, caused by the unequal strains.

This class of material in our opinion should be made of steel that has a high limit of extension, yet strong enough to leave a large factor of safety.

Steel, as regards its application to the construction of locomotives, is making rapid strides as applied to casting, but the limit has not been reached in forgings. All of the spring rigging consisting of equalizers, swords and spring hangers could be made from steel and would give better service than iron, the driver brake work and engine truck also.

For passenger cars the swing hangers and equalizer beams, truss rods, bolsters, side bearings and truss irons. We may remark that the present forging machines are made quick in action for the purpose of welding the iron as it is forced into the matrix or die. This will not answer for steel, as the high heat required for iron brings the steel back to its original ingot grain and consequent weakness; the work on the bar is therefore lost. A steady even pressure will cause the metal to take any shape, provided the machinery is rigid and bears about the same relation to the machinery used for iron as the modern lathe adapted to the use of high speed steel bears to its prototype used in the cutting of iron.

In the construction of freight cars we will take the wooden or composite car, and in passing would say that, with a few exceptions, the work in steel can be bent cold by suitable appliances, and in relation to its lasting or wearing qualities, speaking from experience, steel brake hangers, bolts, truss rods, fulcrums, brake levers and bolts from ⅜ up to 1¾ in. give much better service than their equivalent in puddled bar iron. Even in wreckage arch bars and truss rods are seldom broken and straighten readily at a low red heat, while ordinary bar iron under like conditions is much in evidence as being irrepairable.

As to welding, many hold out that steel cannot be welded. We refer you to the specimens ranging from low carbon to tool steel for your inspection.

The writer is at present in the employ of a corporation who use nothing but open hearth mild steel, having found through experience that it is far the best for general purposes, and the question arises, why do not railroad corporations make more use of this material; are they too conservative? Is it lack of faith in the material or prejudice? Precedent often trammels advance. The defects in wrought iron forgings stimulated the efforts of Bessemer, Sciennmens and other scientists in their research for a material suitable for modern purposes, hence the manufacture of mild steel. The survival of the fittest is here before us in the inert mass at our disposal, and we may well say that "necessity is the moter of invention."

PRESIDENT: We had expected to have with us tonight a long-time friend of Mr. Lace, and knowing that doctors do not always agree, we thought it would add interest if we had someone to open the discussion who did not altogether agree with the author of the paper. I will ask the Secretary to read the letter of Mr. A .W. McCaslin.

Mr. President and Gentlemen:

My esteemed friend, Mr. Lace, should be congratulated on his excellent paper. I have read, frequently and with pleasure, his writings, and have heard him talk on matters pertaining to our craft. He seldom leaves a subject unfinished.

I am pleased to say we are not strangers to each other, but differ some in our opinions as to the relative values of soft steel and wrought iron when used indiscriminately for both the new and repair work on locomotives, coaches, cars, etc.

At the February meeting of the Engineers' Society of Western Pennsylvania, after the paper of the evening was finished, an informal talk followed regarding the use of steel for exposed construction, with particular reference to bridge work. It was made plain that wrought iron would give better results.

Instances were cited where engineers, members of the society, were compelled to condemn this class of steel work when it was but eight years old.

It was also stated, in the general discussion, that the time was near at hand when great changes were sure to occur in the use of steel as now manufactured for outside work.

Soft steel can be manipulated quite as easily as wrought iron, and in shops where iron is exclusively used the foreman is frequently asked by the men who have a solid forging to make to have it made of soft steel.

There is no prejudice against such steel, but there are exceptions taken to its sudden breakage when cold and to the uncertainty in its welded parts. Some will say they can and do weld it as readily and as perfectly as they do wrought iron. But let me tell you something—there is not a broken steel locomotive frame or a broken steel main or side rod welded anywhere in this country, or any other country, that is not welded with wrought iron; barring the thermit weld. Why is this, if this steel can be welded as securely to itself as it can be to wrought iron?

If the above-named articles break through the solid and are re-welded with wrought iron, with the expectation that breakage will be avoided at that point thereafter, one would think the iron superior to the steel and should have been used throughout.

The Pennsylvania Railroad, one of the largest railroad systems in the country, with its advantages of experimental departments, laboratories, testing machines, etc., has forbidden the application of such small parts as grab irons and steep irons made of soft steel to any of their new cars, using wrought iron in preference.

If this metal (soft steel) is not safe to hold to, or to step on, who will name for us its proper uses?

While this steel can be welded perfectly, the reliability of such welds is not equal to that of iron welds.

A. W. McCASLIN.

PRESIDENT: Gentlemen, the subject is now open for discussion and I trust that all will feel at liberty to take a hand. I realize that many times members are not prone to tell of their mistakes and mishaps, but this is a good place to tell your experiences frankly. We would like to hear from Mr. Stewart, of the Pennsylvania.

MR. G. M. STEWART: Mr. President and Members: I must say that I am not prepared to make a speech. I am a good listener. I came here as an invited guest—and I appreciate it—with the idea of learning all I could. I do not know very much about steel or very much about iron, and I am sure there are men here who, though they may not be quite as old, have had more experience in the handling of these particular articles. There is no question that the Pennsylvania Railroad Company does carry out the practice of using wrought iron for steps and grab irons. Of course there are some cars that the company purchase, as, for instance, steel cars, that have steel grab irons. We are at the present time making our equalizers out of iron. We have some little trouble. The equalizers sometimes break. I guess that is common all over the country. They will break in warm weather as well as in cold. Now, really, I am not able, gentlemen, to give you any kind of a talk, but I can confirm the article that was read in respect to grab irons and handles.

MR. THOS. LACE: I would like to ask the gentleman from the Pennsylvania if they use steel or iron side rods on their locomotives.

MR. STEWART: While I am in charge of the car de-
a representative here who works the side rods.

PRESIDENT: We would like to hear from Mr. Gamble.
partment, I think I can say that they use steel. But we have

MR. H. E. GAMBLE: Mr. President and Members: We are making all our side rods of steel. At the present time among our blooms occasionally we get one the surface of which seems to be burned. But we forge the rod out and it seems to follow the hammer on its downward size. But we do not have any trouble with it, although it looks very serious. We get some blooms that form a scale disposition on the outer surface, but we find we can get rid of the bloom all right. As far as the steel casting is concerned in frames, we have been very successful so far. We weld them very readily. We had a little trouble at first with a lot of them. We upset them to shorten and take up the parts that were a little long, and the steel would break open for us. It seems to me as if steel was coming in. There is one serious point to me that I hope we will be able to overcome, it is to weld up the cuttings from these forgings the same as we do wrought iron. The only serious point in using steel, to me, generally, is to work off the cuttings. Our company sells all this material in their metal yard to steel and iron mills in producing steel and bar iron. I hope to see the day when we can utilize that steel the same as we do scrap iron at the present time in forming blooms right at our own works.

MR. G. H. JUDY: I would like to ask the gentleman if they lay iron between the weld of a cast steel frame.

MR. GAMBLE: In some cases of fracture on finished frames from old engines we take iron, the commonest old stuff we can find from scrap in the shop to suit. We find it is a little better than new material. To form scarf on frame V shape clamp up take heats. I think it is the only perfect weld there is on a heavy piece of iron. With the method we are using in our wrought iron work at the present time we are not afraid of shrinkage or the contraction of the frame. We start our frame with slabs, about five or six slabs 14 x 4 ft. in length and we forge complete by piling on.

MR. JUDY: I do not think you understand my question.

MR. GAMBLE: Yes, and I am coming to that. We weld our frame directly from the center, making the braces solid and we chunk the weld. We have good results with this plan.

PRESIDENT: I believe we will all agree there is no intent or purpose to create a prejudice against good wrought iron. Nearly every blacksmith will prefer to make the average forging out of wrought iron if he can get a quality that is satisfactory. The difficulty seems to be in securing good wrought iron. Most of our iron is made from so-called selected scrap, which consists of wrought iron, steel, malleable iron and a great many other materials. With such a mixture it is almost impossible to make a merchantable wrought iron. We would like to hear from the manufacturers of both steel and wrought iron. We would like to hear from Mr. Ickes of the Carnegie Steel Company.

MR. E. T. ICKES: Wish to thank the President and members for their courtesy in inviting me to make a few remarks, especially as I am not very familiar with the work in the railroad end, but rather with the welding and the forging end of the steel business, of which I have seen a good bit. I am in that end of the business where, if there is any trouble with the steel, we have to go out and see what the trouble is. In welding steel, say, for instance, in welding large pipe or tubes, we have found that with open hearth and Bessemer steel a perfect weld may be obtained, as demonstrated many times in testing pipe by pulling it apart, when it will often pull apart, not at the weld, but at a place some distance from the weld, showing that the weld was equal in tensile strength to the steel itself. And in forging, the gentleman stated that he received some blooms that appeared to be burned. If the burning is not too deep it will in the forging and in the machining afterwards be eliminated. It is practically a surface defect and does not injure the quality of the steel unless the burning has taken place to a very great extent. We have found in a good many cases that steel can be welded as well as iron, although there must be more care used in its welding. This is true especially in regard to high carbon steel; the higher the carbon the more care must be used. You can make a good weld even with a very high carbon steel, but it means extreme care in the process. Steel is a great deal more subject to the influence of heat than iron, and it seems to be more a matter of selecting the grade of steel to suit the purpose for which it is intended than anything else.

PRESIDENT: May we hear from Mr. B. E. Stafford.

MR. B. E. D. STAFFORD: Mr. President and Gentlemen: I do not know of a more important subject that could be brought to the attention of this club, and while you have heard from the craftsmen who understand the subject from their end of it, perhaps an opinion from a salesman might be of some use to excite discussion.

In late years mechanics have been reaching out into the scrap pile, expecting to select the proper materials as a base to pile and re-work, with the belief that good wrought iron will result therefrom; knowing by past experience that certain parts of a locomotive were less liable to rupture with a fibrous structure of good quality than with that of a homogenous or steely formation.

Since the advent of the Bessemer and open hearth steels, with their several alloys, to meet the requirements of locomotive service, the use of which has been extensive and in many instances superceding wrought iron, the latter product has suffered principally through inadvertance, due solely to the fact that the line of demarkation has never been drawn between the iron that is developed absolutely from special ore, heightened, refined and manipulated under specific process based on the practical experience and skill of the iron master to give service results, and that of a product which is a mixture of pig and scrap at the mill; and from various qualities of scrap—the accumulation of years—from the general shop standpoint.

The admixture of such large quantities of steel during the past fifteen years in what we term "the scrap pile," found in all railroad shops, offers but a poor base in the process of selecting material for piling and reworking in the effort to produce a good wrought iron structure capable of withstanding shock and vibration. The resulting product is invariably a mass of cement-welded material which is most difficult to classify, and the practice which fails to distinguish in the process of reworking between steel on the one hand and good wrought iron on the other is indeed an injustice to the ability and skill of the iron master who can and will produce wrought bar of that nature to meet service conditions whose general quality throughout will show but a slight depreciation.

The instant mechanics generally begin to draw the line between wrought iron and steel, classifying all scrap mixtures in the steel category and entirely divorcing the iron from all mixtures which would destroy its general quality, then, and not until then, will we be able to determine the true value of wrought iron for locomotive parts in places where shock, vibration and strain are so disastrous and so destructive.

PRESIDENT: May we hear from Mr. Baker.

MR. JAS. H. BAKER: I have listened with interest to the paper of Mr. Lace and the communication from Mr. McCaslin, and I appreciate the point just made by Mr. Stark when he says that we have what is called iron, but really it is hard to find a name for it. When we wanted to make heavy chains, every link of which had to subjected to a breaking test, we soon found that there was only one way to do, and that was to take good pig iron, puddle it and make the chain of this iron. There was not an ounce of scrap run into it. We had but one quality of iron throughout. I would not think today of undertaking to make any high-class iron forging out of iron made in any other way. I think it is due to this society that the steel maker and the iron maker should give the benefit of his views, and not simply his views but his knowledge. The paper gave us reasons for making forgings easier in some cases out of iron than out of steel. For my part I believe there are more forgings that can be made easier out of steel than out of iron, so far as the simple making is concerned. I can give you reasons for that, but I do not want to detain you too long. I think that will be accepted by forge men generally as true. But the question comes afterwards of its service. There is no question in my mind that steel is far superior for many uses, and there is just a little question that iron is for others. I will tell you what I think is the most important point in it. That is, we know that steel is stronger than iron. We know we can twist it and turn it into a hundred shapes and punch holes through it without splitting it, and do a great many other things with it that we can not do with iron. But if we know that steel is the stronger, and that we can make many forgings out of it easier. the question comes to us why is it not more largely used? It is largely supposed that the difficulty is due to the working. I think it is more largely due to the very last heat. Now we have heard a good deal about the crystallization of steel in service. I believe that you can take a piece of steel and put it into the condition that it will not show any crystalline structure whatever, and I am almost ready to venture that there is not anybody here who can take that bar of steel that has been put into an amorphous condition and by any sort of physical use—(I am not talking about heat)—make that into a crystalline bar of steel. When Mr. Stucki told me today that he would like to have me come down here tonight I put in my pocket some samples that we were looking at which illustrate what I mean. Here are two pieces of steel that are just the same. It is supposed to have been put into its best condition and a good deal of pains was taken to work it. If you look at it you will find that it has a crystalline structure. Here is a piece of the same steel that has not been heated properly and in order to break it in two it would have to be filed about a third of the way through. One of these is crystalline and the other has an entire absence of it, and yet they are of the same piece of steel. If we can succeed in putting steel in that reliable condition in our forgings in a commercial way I think we will help the steel man most wonderfully. I will say this further—talk is cheap, unless somebody is suing you for a breach of promise—if you will take what you call annealing, that here I am a heretic, too, as it is generally understood. Take anything you have in your service, say knuckle pins. Suppose you get a medium carbon knuckle pin and you break it and it has a crystalline structure. If you will take the pains to send it to me I will send it back to you without that crystalline structure, and it will take three or four or five times as much to break it as it did before. We get specifications from railway men saying that they must be carefully annealed, and it is just that I am talking about. It has been carefully disintegrated and made into a crystalline structure that is ready to break the moment you nick and give it a blow. I know there are two sides to the question of using iron and steel. I will tell you how it sometimes looks to me by telling you a story.

A man met a Norwegian friend of his up in the Northwest and he says:

"I hear that you have been doing well; you have married a rich wife?"

He says: "Not very goot; she is stingy. She only give me a tousand dollar."

"Well," he says, "that is bad."

"No, not wery bad, not wery bad. I take that tousand dollar and I buy me a tousand sheep ond a ranch in Montana."

Well, that is good."

"No, not wery good. The blizzard come along and kill all dem sheep."

"Well, after all that is bad, John."

"No, not wery bad. I sell the pelts of dem sheep for $1500 ond that ranch and I buy me a nice house in Minneapolis."

"Well, that is good; that is good, sure."

"No, not wery goot, not wery goot. The fire burned the house down and I have no insurance on him.

"Well, now, John, I did not know that; that is a pity; that is bad."

"No, no; not wery bad. That tam woman burn up in it."

PRESIDENT: We would like to hear from Mr. Speller, Metallurgical Engineer of the National Tube Company.

MR. FRANK N. SPELLER: Mr. Chairman and Gentlemen: It is very generous of you to offer me the privilege of the floor, this being the first time I have had the pleasure of attending one of your meetings. You have asked for an expression of opinion from those who are manufacturers of iron or steel. We have manufactured both for welded pipe for many years. In looking for the ideal material for welded tubes and pipe we aim for the highest degree of uniformity, homogenity and weldability, with as much strength and ductility as is consistent with these other qualities. In these properties our dead soft Bessemer steel—which is as near to pure iron as is at present possible to make the metal—is more satisfactory than wrought iron, there being less loss by defective welds, blisters, etc. Experience in the field also bears out this advantage possessed by steel.

Mr. Lace's paper has interested me very much and his remarks on the superior welding quality of soft steel are borne out, as I have said, by our experience in welding hundreds of tons of pipe every day.

Some have criticised steel on the point of durability. We instituted a careful search for comparisons of the life of wrought iron and steel some time ago, and as a result have a number of practical illustrations, as well as numerous laboratory tests which show very little difference between the two in this respect. Modern pipe steel shows a marked superiority over iron under corrosion and does not pit so badly. This material undoubtedly has a great future for boiler tubes.

The crystalized sample of steel passed round by Mr. Baker looked like a case of overheating. Any soft steel or iron can be restored from this to the fine grained state by heating to a bright orange for a few minutes and allowing to cool slowly in the air. We make a practice of annealing the ends of all steel tubes to avoid the chance of any crystalized pieces getting out. The ductility and power to stand cold hammering is considerably increased by this heat treatment.

PRESIDENT: May we hear from Mr. Judy.

MR. G. H. JUDY: Mr. President and Gentlemen: I have heard something about the different uses of steel and the different ways of working it, and I have heard something that rather surprises me, and that is to find anything but crystalline steel. I have worked steel for a long time, and my friends, Mr. Lace and Mr. McCaslin and different ones of us, have argued this point again and again, and I have not yet been convinced that there is anything in steel but crystal. One of our greatest steel men in the world, from Pittsburgh, says steel is crystalline. If we would get fiber we would get iron; that is my idea about it. We can get strong steel by having it annealed, as Mr. Baker has just said. To return to steel and iron forging, there is no question in the mind of any person who is working steel for locomotive and car work but believes that we can take open hearth steel or very low carbon and do more work with less losses than we can with iron. In our bending of corner bands, grab irons and work of that kind we will not have a loss of one piece in a hundred; where we take iron and go through the same process we may lose fifty pieces out of a hundred. Without paying attention to the iron we can lose fifty out of a hundred by upsetting and bending and finishing and forging. But while it holds good in that case, as Mr. McCaslin has said, there are points where we will not be able to determine whether it is best to use soft steel. There are places where we would not risk it. We would not venture it upon our locomotives from the fact that we are not sure that it is going to remain there. We know iron will stand it if we have fibrous iron, and we know that we can get fibrous iron; not that steel is not stronger than iron. We calculate when we use soft steel for forgings that we have twenty per cent more strength than with iron. But there is some danger of it letting go quickly with a steel forging. We feel safer in making a locomotive frame out of iron than out of steel from the very fact that it will show a crack and always give us a warning, where a piece of steel will likely break right through and let go. Take the brake rod of a passenger coach. We do not feel perfectly safe in making that of steel. The rod itself is all right, but it is where you have to weld your rod to the jaws that we have our troubles. As a gentleman said a few minutes ago, it does not break where the weld is. That is true right along in welds of iron as well as of steel. It does not break in the weld, but the weld is the cause of the break. It breaks on one or the other side of the weld, just back far enough where there has been no work on the metal when it has been heated up to a cinder heat. We find the same thing in both iron and steel. Where you have hammered, you have the strength; but where you have the cinder heat upon the metal, where you have not worked it afterward, there is where you find the weakness in both iron and steel. Another point: I think Mr. Gamble, in speaking of welding frames, did not quite understand my question. If a steel locomotive frame is best to be put into service, and breaks, and has to be welded with iron—I do not say it has to be, but that is the practice, we all lay a piece of iron between the ends of the fractured frame and bring them together to make the weld. Why do we put that iron in there if that steel is so easily welded and is so sure? Why do we make that connection with iron, which is twenty per cent weaker than the steel? I am not doing this to down steel, because I am one of the strong advocates of soft steel, but there are some things that we have got to meet yet that we have not met. I would like to see steel used exclusively in our car work and in our locomotive work. It will save us in a great many ways. We will not have to contend with red short iron or coal short iron. And we would lose little of our material in working. Speaking of the grab irons, you could not put a steel grab iron on the cars of some railroads if you would pay them to let you, though the wrought iron grab iron will not stand half the work. They are wedded to the wrought iron because they can trust it. But if they will take good open hearth steel and make a grab iron that has to have a boss on it and a hole punched in it and test the steel and wrought iron the same way by driving a drift in the hole, you will find that the steel grab iron will drift further than the wrought iron without breaking. But they are wedded to wrought iron and you cannot change their opinions.

PRESIDENT: Is it not a fact that a very large majority of the forgings that go into the construction of a locomotive or a car do not have to be welded in their manufacture?

MR. JUDY: A big proportion has to be welded.

PRESIDENT: Not in railroad car work.

MR. B. E. D. STAFFORD: I think the great tendency in discussing the question of iron is to draw conclusions from the merchantable common bar and scrap iron reworked. We are mislead in a discussion where a man forms his opinion based on a mixed iron or iron piled or reworked from the scrap pile. It is just as I said before, I hope to see the time when we will draw the line of demarkation and talk wrought iron from an iron standpoint and not from a mixture where we do not know whether the so-called iron is three-quarters steel or not. In discussing this question your Master Blacksmiths' Association, etc., are continually talking from the scrap iron standpoint and not from the bona fide wrought iron base, and I would like to see the line of demarkation drawn, where scrap iron will be put in the steel catagory, enabling them to more justly adhere to the basic principle of working good wrought iron, when dwelling on the results gotten from its service.

MR. JUDY: I understand that we are talking from a practical standpoint, what is good practice. The usefulness of iron and the usefulness of steel in the construction of railway work. We have got our scrap pile, we have got to work it up. We cannot go to the mills and tell them we want iron for every purpose every time we need it. We don't take bar iron to make work out of for which we have to have hammered iron for. We have got to compress it or hammer it down to make it solid that it will do our work. Bar iron is often too soft. We hammer it and get better service than a good rolled bar or fibrous iron. When we speak of iron it is, as it occurs to us in our practice, in our railway work. We have got to use it and we do use it and we are successful in using it. If we want stay bolt iron we take it, but we do not go after stay bolt iron for engine frames and forgings.

MR. R. L. KLEINE: I want to ask a few questions. We have had quite a number of six wheel truck equalizers which were made from a low carbon steel break under dining cars. We first thought they were probably worked a little too cold and went into the matter very thoroughly. This low carbon steel was bought according to specifications, and we had bar after bar break. We again went into the market for some more low carbon steel and paid special attention to forming and annealing after we had them formed. They also broke. It got very serious and we looked around and obtained some wrought iron and put that into the equalizer bars and they are under the cars today. This experience dates back only about a year. The Pullman people use nothing but wrought iron in their equalizing bar. The equalizing bars which were broken had been carefully checked up and it was not a question of section. I would like to ask some one here how that was brought about, and if the low carbon steel for a purpose of this kind is as good as wrought iron?

We have some of our steel cars, that are built outside, that are equipped with steel grab irons and we have no end of trouble with those steel grab irons breaking, which is not the case with our wrought iron grab irons. Also in rolled section steel, which is worked up into shapes, "I" beams for instance, which is cut and shaped up; take for instance "I" beam truck sides cut out and shaped to admit journal boxes, we find sections of that breaking in service which I can not explain in any other way but that in some manner due to the rolling the metal is deformed and hardened.

MR. THOS. LACE: To the best of my belief in a case of that sort the short bend that is made would make it break where it rests upon the box.

MR. KLEINE: The break was on the long end in the turn where it rests on the box.

MR. LACE: The man probably brought it to a welding heat to bend it. If you do not work steel at a low heat it is weak, it gets more like cast steel; whereas, if it is worked at a low heat the material is consolidated and in the form that you get a bar from a rolling mill. The welding heat brings it back to the first form that it was cast in. Then another reason, it might be made of Bessemer steel or something like that. Bessemer steel is more susceptible to shock than open hearth steel. I have in my time made wrought straps out of steel. I was told to make them out of iron, but every chance I got I made them out of steel, because I knew that iron straps would break. Engines that were bought from a manufacturer—I was then in charge of one of the largest repairing shops in the country—iron straps would generally break. I was cautioned not to make them out of steel, but I knew it was the best material. And I cannot remember of a strap breaking when replaced by steel, for the simple reason that everything before it breaks must go beyond its elastic limit; when it gets over its elastic limit it breaks. If that beam is made a little heavier of section in the proper places there is no reason that it should not answer the purpose, even if it is cast steel. But the high heat is the only reason in my opinion.

MR. R. L. KLEINE: I would state that this low carbon steel was bought according to specifications and was tested by our testing department, and furthermore that in some cases the section broke in detail, that is, you could see an old fracture for a distance of about two-thirds of the way through; in other cases, three-fourths of the area had the detail fracture in it; showing that there was a factor of safety of at least four or five, possibly six. The blacksmith who formed the equalizers is here and he can tell you just exactly at what heat the equalizer bar was forged.

MR. G. W. STEWART: Gentlemen: We do have a good bit of trouble with those equalizers. I cannot say what the trouble is myself, but I do know this, that they break, and when they break the peculiar thing about them is that you can see something like the circle of the rainbow, where they were not broken all at once, but little by little until they worked all the way through. Now those equalizers that broke were not forged, but were bent; heated to an ordinary white heat, not white heat but red, just turning from the red heat, and put into a former and bent slowly around into their shape.

MR. WM. T. SCHOMBERG: As I understand the subject, the reason for the failure of these equalizers was they were heated to as high a heat as they would stand, or possibly a little higher. (I have no doubt Mr. Stewart did not see all the heats.) And when the steel was bent the granules were disturbed and they were not hammered back to the solid again. That, in my mind, explains the cause of the equalizers breaking; it will do so every time. Heat a piece of steel to even a good red and let it cool off without any work whatever, and you have your metal very much weakened. When it comes to using steel for railway purposes I am something like Mr. Lace, I cannot talk on the subject from a scientific standpoint, but have had some little experience. One of the first things I noticed about soft steel was in the shape of wire nails that were used in nailing wooden shingle to a roof; they lasted about two and a half or three years. The action of the weather and the shingles retaining moisture caused the steel nails to rust off, the wind blowing the shingles from the roof. Cut wrought iron nails last as long as the shingles last. I believe the same thing would happen to bolts used for car work and consequently would not be in favor of using steel bolts for car work. I have charge of a railway blacksmith shop and at one time ordered some merchant steel to make bolt for engine work. The machinists all seemed to want steel bolts, particularly rod bolts. After using them a little while no one wanted them. The principal trouble seemed to be that they would not stand the shearing strain. There are many forgings made in railway smith shops that might be called emergency jobs, ("wanted at once, orders marked rush"). We have a great many jobs of locomotive repairs, and we go to the scrap pile and select our iron and sometimes a piece of steel gets in. Suppose you are making a draw bar which joins the locomotive and tender. You get a piece of steel worked in with the iron and you have a weak place in the draw bar. It may last a trip, it may last a year, but eventually you will have a fracture caused by the steel, be it soft steel or hard steel. If you wanted to use merchant steel or mild steel for railroad purposes you would have to have piles of ingots that very few railroad companies would have room for, and it would take a very large ingot to make a locomotive frame. The weakness of a weld in steel as well as in iron, is, as Mr. Judy explained, on either side of the weld. The heat may be proper and the work properly done, but the iron or steel is not worked on either side of the weld same as it is at the weld, consequently you have a weakness.

MR. F. J. REEVE: I am connected with a company that uses all open hearth steel, and sells its scrap, so that somebody else gets the benefit of that, but I have not heard anyone tell this evening the specifications of the steel they use. I have with me the specifications used by our company, and perhaps some of the members of the club would like to know what other people are using in that line, and in case you ever became converted to the use of open hearth steel you would know something that is all right. "Steel as made by the open hearth process and containing less than .06 of phosphorous and 4½ of sulphur and .8 of manganese; steel must show an ultimate strength of not less than 60,000 and not more than 65,000 pounds per square inch and an elastic limit of at least 30,000." When the tensile strength is between 50,000 and 60,000 it must have an elongation of at least 26% in eight inches, and when the tensile strength is between 60,000 and 65,000 it must have an elongation of at least 24% in eight inches and must bend double and flatten down either hot or cold. As I said before, we use a great deal of open hearth steel, sometimes as high as 240 tons a month, and we use it both in locomotive work and car work. I have always been used to using wrought iron previous to coming with this company, but I have watched it pretty closely in the construction of cars, and I have yet to find a truss rod or an arch bar or any vital member in a car made of open hearth steel under these specifications that failed. The gentleman spoke of the use of bolts. Of course, my experience is limited in that line, as we have only about 6000 cars, but I find the tendency is not to rust any more than a wrought iron bolt. In regard to the use of steel in mine car work, it has been my observation that axles and the various metal parts of a mine car are not affected by water or moisture as much as wrougt iron.

MR. E. T. ICKES: With regard to the corrodibility of steel, would like to mention the fact that we are selling at the present time a large quantity of open hearth steel and also Bessemer steel for the manufacture of track bolts, most of it open hearth steel, and that this is a case where the steel is exposed to the weather and subjct to corrosive action. They are evidently giving very good service, because the railroads are placing large orders with the bolt manufacturers for this class of bolts, and reports that we have from them show that the bolts stand up very well and compare very favorably with iron.

MR. GAMBLE: The steel men will understand me in regard to the steel question. We use a great deal of it, especially for drop forgings, for bolts, for anything we can work it into. It is all right as long as they can keep down the carbon. These little things are bound to come up, but I think they will get the steel down to a point where we will use it pretty generally.

PRESIDENT: Our railroad cars are generally carried on steel axles, so I believe you can feel safe in riding home from fear of harm. The hour is growing late, and we have the distinguished honor of having with us one of the older members of the Master Car Builders Association, and one of the oldest railway club members of the country, and we would like to hear from Mr. Eugene Chamberlain of New York City.

MR. EUGENE CHAMBERLAIN: Mr. Chairman and Gentlemen of the Pittsburgh Railway Club: It affords me especial pleasure to be with you this evening as an invited guest. And first of all I would like to compliment your worthy chairman, whom it has been my pleasure to know for a number of years, and also to recognize his marked ability, and also your genial secretary, who causes me from day to day more or less trouble, but in such a courteous manner that the trouble becomes a pleasure. It makes me feel very much at home among you. I have the honor to be a member of the New York Railway Club, also for a number of years of the Central Railway Club of Buffalo, and the intelligence, ingenuity and skill that is represented here tonight rate this Pittsburgh Club certainly with the A's among the railway clubs of the United States. Coming from a section of the country as I do where a pink tea is a dissipation and the reading of Browning wild recklessness, into this city where the hum of industry and the buzzing of machinery attacks your ears at every hand; where with your marvelous machinery you produce everything except families, and yet we find no evidences of race suicide, I am surprised to see a gentleman get up here tonight and admit that anything manufactured in the city of Pittsburgh "breaks." I am utterly confounded. The gentlemen you send east to canvass at our shops and general offices carry a very different story with them. However, I suppose they are allowed to indulge in a little pleasantry of that character when they get away from home. I have been very much interested in the paper read by the gentleman to the left who in personal appearance recembles Admiral Dewey and has a good deal of his tenacity; also the gentleman to the left who reminds me of the forcefulness of Senator Proctor of Vermont. But it has occurred to me that when you find a wrought iron grab handle broken it is for a good and sufficient reason as explained by several of the gentlemen here tonight. The short bends in steel, as so clearly explained in the discussion, produces a possibility for such difficulties to occur; and it must be apparent to you that unquestionably inspectors in behalf of the inter-state commerce commission, who are looking so carefully today after the condition of safety appliances, that one essential feature that you should safeguard in every particular is that ladder which the brakeman ascends to the top of the car. It is for the protection of human life that that material should be of the best quality that can possibly be manufactured. The gentleman has asked, and very tritely, a question in his paper tonight, why the railroad corporations of the United States are so conservative? Why they do not take up a great deal more promptly any new device, or something that mechanical or chemical analysis shows you is absolutely the thing to use? Gentlemen, are you aware that the railroads of the United States are a stamping ground for your experiments? It is right that they should be. I believe that they do not hesitate to try out that which seems to have merit, and they will not stand in the way of progress. It is absolutely necessary that some one make those experiments. I would call your attention to the fact that any new device, or any new material you place on a freight car passing through this country in interchange under the M. C. B. Rules, it requires that you should, when repairing, replace with the same character of material that you remove. If you fail to do this you will have a card pointing out your omission as a result. A mechanic may take his chisel and mallet and frame a car sill, or take his jack knife and whittle out a rough pattern and from it get a gray iron casting. The least line of resistance is usually followed, and to get rid of a piece of the equipment to cause it to perform an earning capacity as early as possible is desirable. I have been interested in hearing the remarks of the gentleman from the great Pennsylvania system, and I thank you all for your courtesy.

A VOICE: I would like to ask Mr. Chamberlain if it is not a fact that the New York Central Railway system uses only iron axles on their cars and not steel?

MR. CHAMBERLAIN: They have used both steel and hammered axles. I am not prepared to furnish exact information as to what extent. They have had experience with both.

PRESIDENT: I regret very much that we have not more time, for I know there are many persons who could talk on this subject intelligently; but the hour is growing late and we want to add pleasure to business, and it will now be in order to adjourn.

MR. KLEINE: Before we adjourn I move a vote of thanks to the speaker, Mr. Thomas Lace, for the very able paper presented here tonight.

The motion was carried by a unanimous rising vote.

On motion, adjourned.

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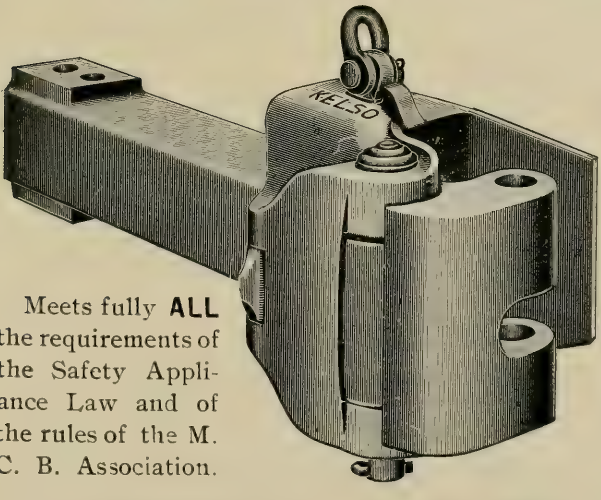

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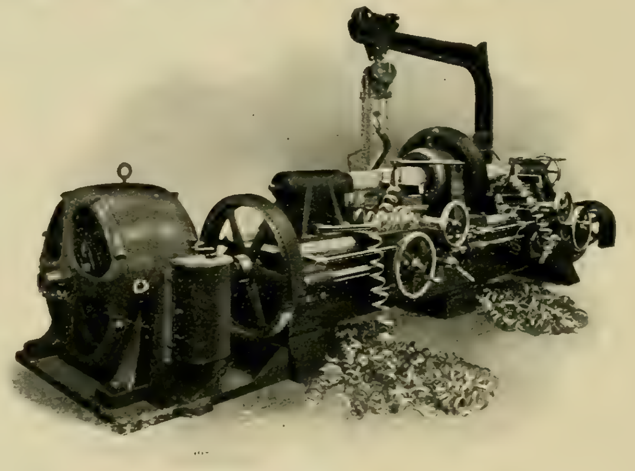

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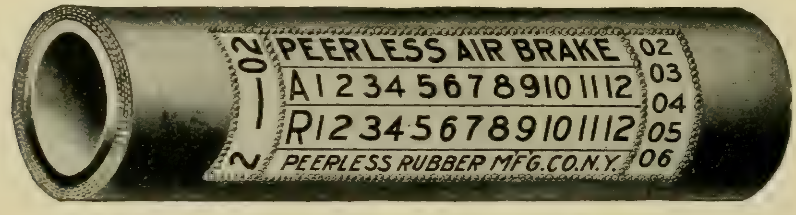
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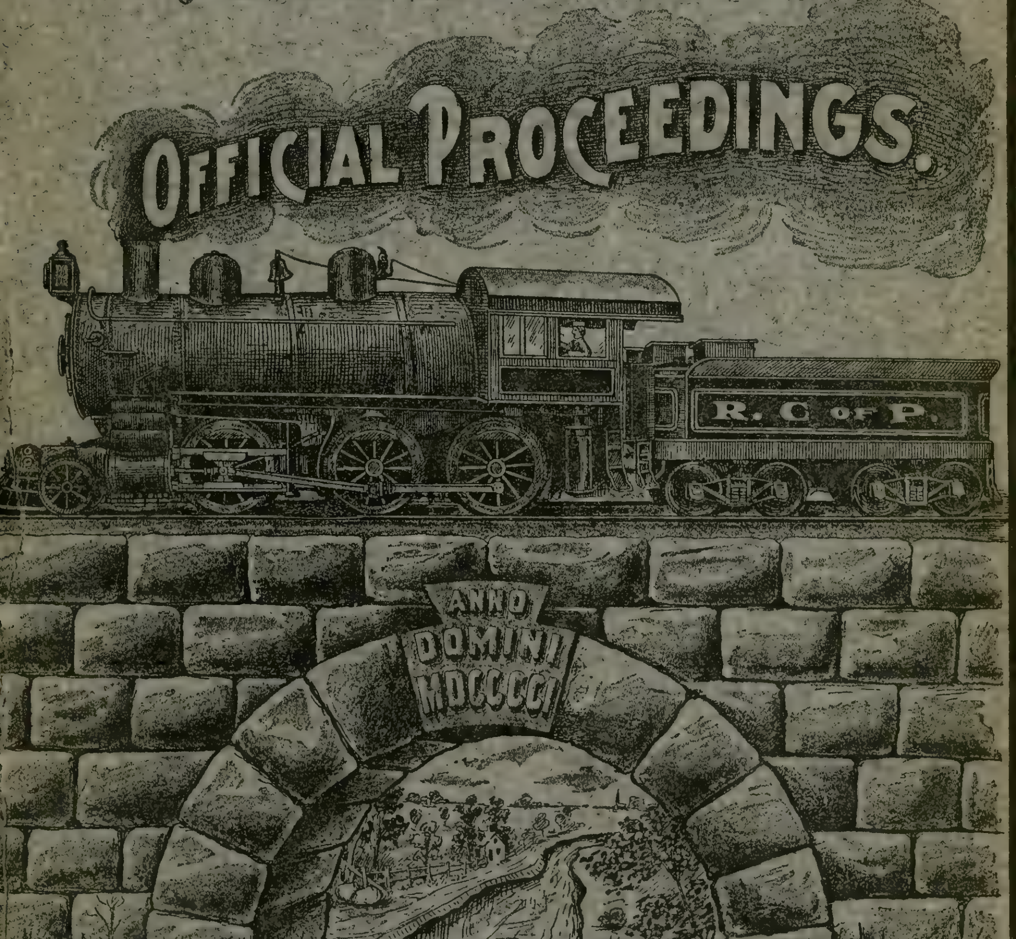

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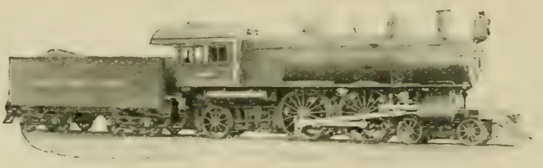

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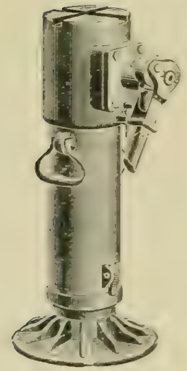

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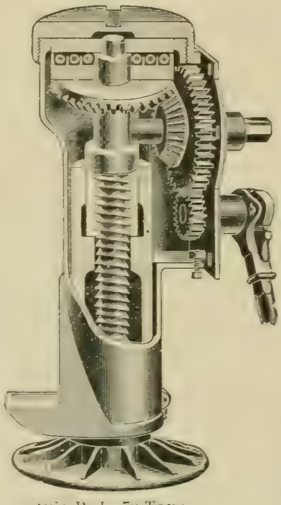

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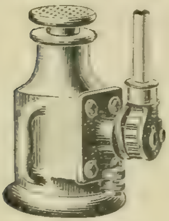

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of the

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VOL. V.
No 6.

Pittsburgh, Pa., Apr. 27, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

APRIL 27th, 1906.

The meeting was called to order at the Monongahela House, Pittsburgh, Pa., at 8 o'clock P. M., with President F. H. Stark in the chair.

The following gentlemen registered:

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Krause, Julius.
Lanahan, Frank J.
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Wright, John.
Yereance, W. B.

PRESIDENT: As the minutes of the last meeting are in the hands of the printer, if there are no objections they will stand approved as printed?

Secretary Conway read the following list of applicants for membership:

Ault, Chas. B., Sales Manager, Homestead Valve Mfg. Co., Homestead, Pa.

Chamberlain, E., Chairman F. C. R. P., New York Central Lines, Grand Central Station, New York, N. Y.

Cosgrove, H., Foreman P. R. R. Co., Car Dep't., Pitcairn, Pa.

Crawford, Harry M., Transitman, Monongahela Railroad Co., Brownsville, Pa.

Cunningham, W. F., F. C. A., P. & L. E. R. R. Co., General Office, Pittsburgh, Pa.

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Fettinger, H. O., Steam Heat & Air Brake Inspr., P. R. R. Co., Altoona, Pa.

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Hackenberg, J. H., Vice President's office, Pressed Steel Car Co., Farmers Bank Bldg., Pittsburgh, Pa.

Ickes, Elwood T., Metallurgical Dep't., Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

Lacey, G. S., Pur. Agent, Republic Iron & Steel Co., Frick Bldg., Pittsburgh, Pa.

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Mehaffey, Geo. W., Storekeeper, P. R. R. Co., Pitcairn Shops Pitcairn, Pa.

Semple, Geo. E., H. W. Johns-Manville Co., 218 First Ave. Pittsburgh, Pa.

Swartz, H. E., Chief Clerk, Sales Dept'., Pressed Steel Car Co., Farmers Bank Bldg., Pittsburgh, Pa.

Travis, O. H., Electrician, P. R. R. Co., Union Station, Pitts-Burgh, Pa.

White, F. B., Special Inspector, P. R. R., Pitcairn Shops, Pitcairn, Pa.

President: These applicants will become members as soon as approved by the Executive Committee.

Report of Committee on Revision of M. C. B. Rules of Interchange.

Gentlemen:

Your Standing Committee on revision of M. C. B. Rules of Interchange, after careful consideration of the 1905 Rules, submits the following report:

The 1905 Rules of Interchange, we are glad to state, have proven very satisfactory, and, therefore, no necessity exists for any radical changes; but in order to facilitate freight movement and keep pace with the ever changing conditions, your Committee offers such changes and additions which in their opinion will conform to the fundamental principles and true spirit of the M. C. B. Association.

While a few of the recommendations of last year, which were not acted upon favorably by the Arbitration Committee, are again presented, your Committee deemed them of such vital importance that they have again embodied them in the report herewith submitted.

The explanation for the changes and modifications in the various rules appear under the respective rules.

CHANGES IN M. C. B. RULES.

Rule 4, Pages 3 and 4.

Omit Reference to Rule "45" in last line.

Since it is unlawful to move a car from an interchange point with the uncoupling attachments inoperative, the reference to Rule 45 providing that an M. C. B. defect card should be attached to the car, in case the delivering company fails to make repairs, should be eliminated.

Add after the word timbers in last line the following:

"*On wooden cars; and on steel cars to card-board located either on cross tie under car or on inside of side sill at the end of car.*"

In order to enable the inspectors to readily locate defect cards at interchange points, the above addition is suggested to this rule, which provides a definite location for defect and repair cards on steel cars, similarly to that called for on wooden cars. The location recommended is the one generally adopted by steel car owners who have provided for the defect and repair card board in the construction of the cars.

Rule 10, Pages 4 and 5.

Change to read: "*Worn Flange: Wheels under cars of less than* 80,000 *pounds capacity, with flanges having flat vertical surfaces extending more than* 1 *inch from tread, or flange* 1 *inch thick or less. Wheels under cars of* 80,000 *pounds capacity with flanges having flat vertical surfaces more than* 7-8 *inch from tread, or flanges less than* 1 1-16 *inches thick. Wheels under cars of over* 80,000 *pounds capacity with flanges having flat vertical surfaces extending more than* 7-8 *inch from tread, or flanges less than* 1 1-8 *inches thick. (See Figs.* 4 *and* 4*A.)*"

The large number of flanges breaking under cars of over 80,000 pounds capacity, when flanges have been worn down so that they measure between 1 1-16 and 1 1-8 inches in thickness, has led your Committee to recommend that the minimum limit of thickness be raised from 1 1-16 to 1 1-8 inches, as from its investigation it has determined that with the increased limit of thickness a large number of accidents will be avoided.

Rule 10-A, Page 5.

Add: "*Worn Flange: Steel and steel-tired wheels with flanges having flat vertical surfaces extending more than one inch from tread, or flange one inch thick or less. (Owners responsible.) (See Figs. 4 and 4-A.)*"

On account of the failures of the cast iron wheels under the heavier capacity cars, steel and steel tired wheels are being applied; and in order that railroad companies handling cars so equipped may properly treat the same in repairs, the above provision is recommended.

Rule 11, Page 5.

Omit last sentence reading "*This does not apply to wheels cast prior to September 1st,* 1904."

As these wheels have all been eliminated from service, this part of the rule is recommended to be dropped.

Rule 12-A, Page 5.

Add: "*Steel or steel tired wheels with tread or tire thinner than shown in Fig. 4b.*"

The above addition is recommended for the same reason as given under Rule 10-A.

Rule 16-A, Page 5.

Add: "*Steel or steel tired wheels loose, broken or cracked hubs, plates, bolts, retaining ring or tire under fair usage. (Owners responsible.)*"

Rule 17, Page 5.

Omit "Fig. 6" from this rule made for the same reason as given under Rule 11.

Rule 18, Page 5.

Add after the word "*The*" in the first line the following: "*Back or.*"

The question is continually raised by inspectors what is the outside or flange, and it was thought that the ddition of the words "back or" would make the rule more definite and comprehensive to the inspectors.

Rule 19, Page 5.

Change to read: "*Flat Sliding: If the spot caused by sliding is 2 1-2 inches or more in length on cars under* 100,000 *pounds capacity, and if the spots are 2 inches or over in length on cars of* 100,000 *pounds capacity and over. (Care should be taken to distinguish this defect from worn through chill.)*"

Wheels under the heavier capacity cars are rendered liable to breakage due to pounding when the flat spots on same are over two inches in length, and rails have been found broken in the winter time, the cause for same being directly attributed to the larger flat spots on wheels under 100,000 pounds capacity cars.

Rule 19-A, Page 5.

Add: "*Flat Sliding: If the spot caused by sliding exceeds* 1 1-2 *inches in length on steel or steel tired wheels (delivering company responsible).*"

Due to adding steel and steel-tired wheels to the rules, the above recommendation would seem to be necessary. The limit of sliding when the spot exceeds 1 1-2 inches in length was deemed expedient on account of the liability of breakage of the steel tire.

Fig. 1, Page 6.

Design of wheel gauge changed as shown below to embody recommendations in foregoing rules.

Figs. 3, 4, 4-A and 5, Pages 8 and 9.

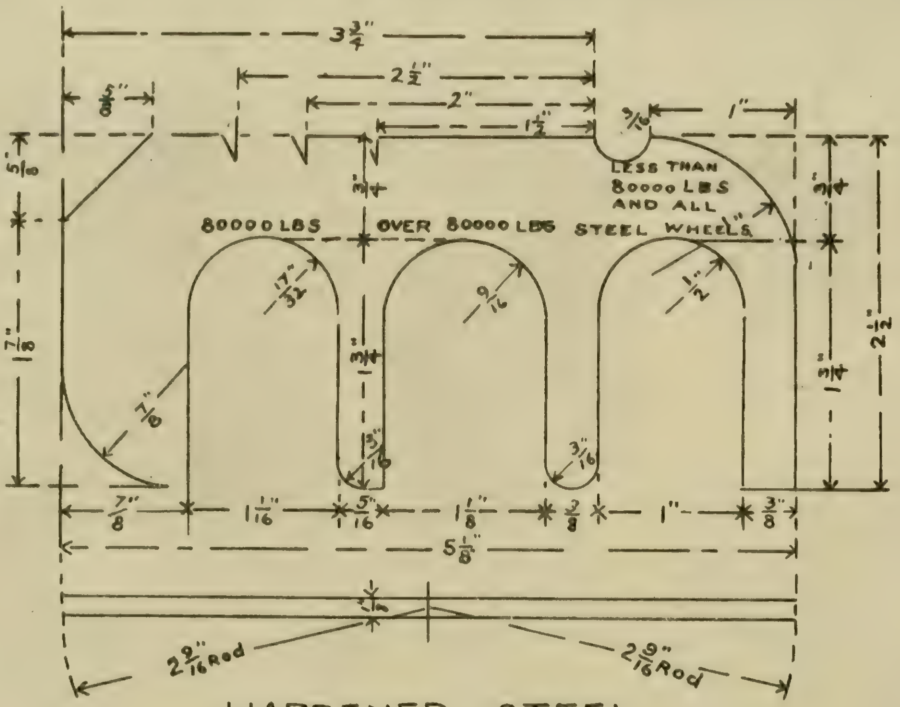
Change gauge applied to these figures to that shown in Fig. 1.

Note under Fig. 4, Page 8.

Change to read: "*For wheels under cars of less than* 80,000 *pounds capacity and steel or steel tired wheels, with flanges* 1 *inch thick or less;* 80,000 *pounds capacity with flanges less than* 1 1-16 *inches thick; over* 80,000 *pounds capacity with flanges less than* 1 1-8 *inches thick.*"

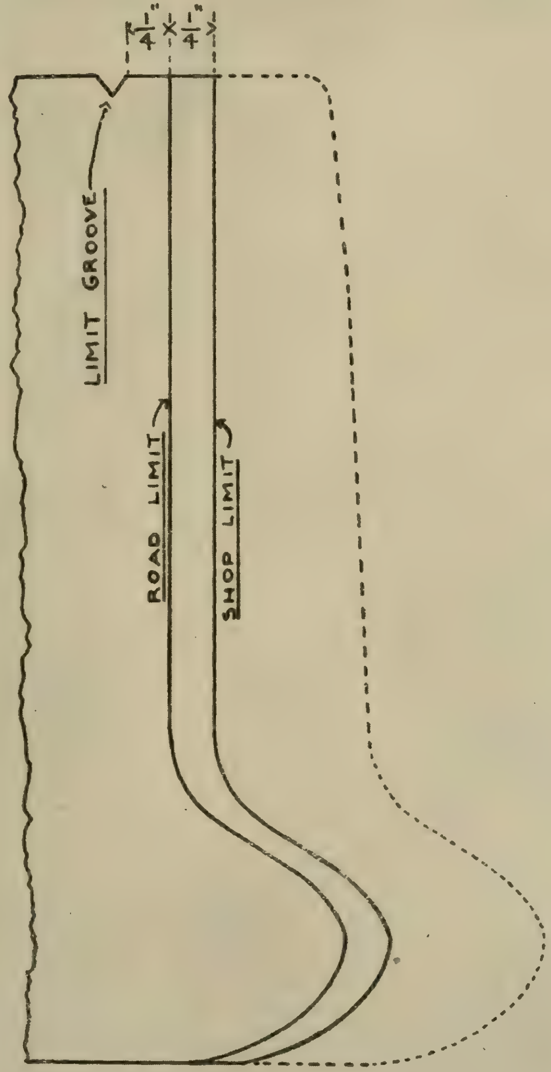
Note under Fig. 4-A, Page 9.

Change to read: "*For wheels under cars of less than* 80,000 *pounds capacity or steel and steel-tired wheels,* 1 *inch from tread;* 80,000 *pounds capacity and over, 7-8 inch from tread.*"



HARDENED STEEL

FIG. 1 PAGE 6



ROAD AND SHOP LIMIT FOR STEEL AND STEEL TIRED WHEELS.

FIG. 48.

Fig. 4-B, Page 9.

Add "*Fig. 4-B*," showing steel or steel-tired wheel tread limit of thickness.

Rule 48, Page 15.

Omit the words "*coupler stop*" in second line.

Your Committee recommends the omission of "coupler stop" from combination defect with coupler, for the reason that there are a large number of coupler stops, on the older classes of cars, too weak to stand the strain placed upon same in the regular train service; furthermore, owners are permitting their cars to run with these weak and broken stops, which cannot be readily determined by an inspector, and which is resulting in the couplers being broken in service, and after dismantling rigging it is found that the coupler stops have been broken for some time. Inasmuch as this is not found to be the case where substantial coupler stops are provided, your Committee is of the opinion that coupler stops should be eliminated from combination defects.

Rule 50, Page 16.

Omit the words "*Coupler stop*" in first line.

Explanation under Rule 48 applies also to above recommendation.

Rule 52, Page 16.

Omit this rule.

Dead blocks are in a large number of cases only 2 1-2 to 3 inches thick and often not protected with a substantial angle iron against which coupler horn would strike; the result is that the dead block is "chawed out" by the striking of the coupler horn, spring draft rigging damaged, and end sill weakened, rendering it liable to breakage. In many cases decayed end sills must be renewed and it is impossible to replace dead block on account of its defective condition, thus rendering company making repairs responsible. Your Committee therefore recommends that this be eliminated from combination defects.

Rule 53, Page 16.

Omit the words "*Coupler stop*" in third line and "*Dead block*" in last line.

The above recommendation follows for the reasons given in preceding rules.

Rule 56, Page 16.

Omit the second note under this rule referring to definition of "*Dead block.*"

The above is recommended on account of elimination of dead blocks from combination defects.

Rule 57, Page 16.

Add after "*Repaired*" in last line the following, "*Except as provided for in Rule* 125."

Cars have been repaired and owners objected to bill on account of the extensive repairs involved, which repairs were made on authority of Rule 57. It would, therefore, seem advisable to add the above clause, which will avoid further contention on the proper interpretation of Rule 57.

Rule 60, Page 17.

Add new rule after Rule 60 reading as follows: "*When metal brake beams require renewal the same may be replaced with any metal brake beam meeting M. C. B. specifications, provided no changes in hangers or attachments are required.*"

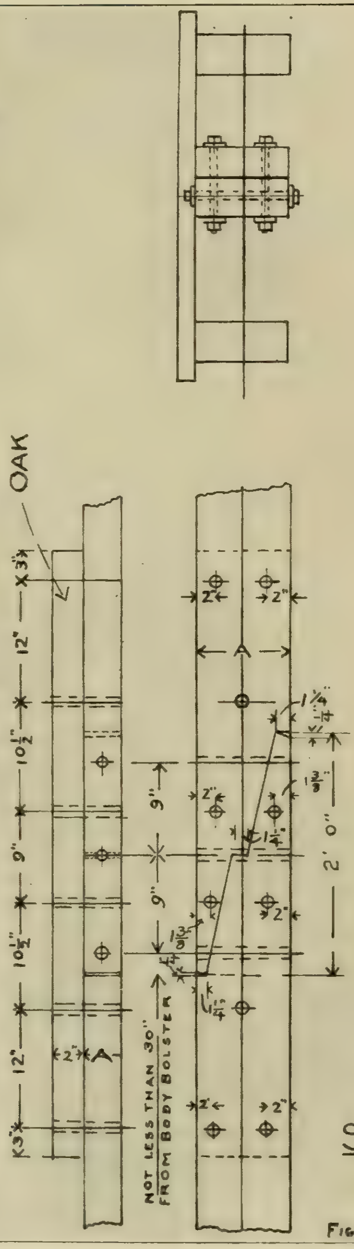
Since the M. C. B. Association has adopted specifications as a standard for brake beams, it is the opinion of your Committee that it should be permissible to replace a metal brake beam requiring repairs with a metal brake beam which meets the standard specifications of the Association, providing no changes in hangers or attachments are necessitated by such a change. This would greatly facilitate the repairs to foreign cars with a minimum amount of stock to be carried in the line of brake beams, and your committee strongly recommends the addition of this rule for consideration.

Rule 65, Pages 19 and 20.

Change first paragraph of this rule to read: "*Draft timbers must not be spliced. All sills may be spliced once. Longitudinal sills, other than center sills, when less than* 12 *inches in depth, the plan shown in Fig.* 8 *is to be followed; when the sills are* 12 *inches or more in depth the plan shown in Fig.* 9 *is to be followed; when center sills are spliced the plan shown in Fig. 9-A is to be followed.*"

Add "*Fig. 9-A.*"

"*The splice may be located either side of body bolster, but*



METHOD OF SPLICING CENTER SILLS

Fig. 9A

the nearest point of any splice must not be within 12 *inches of same, excepting centre sills, which must be spliced between body bolsters and cross-tie timbers and not within* 30 *inches of either. The splicing of two adjacent sills at the same end of the car, or the splicing of any sill between cross-tie timbers, will not be allowed.*"

On account of the scarcity of yellow pine timber and the fact that, at times, it has been unprocurable; besides the fact that cars having center sills spliced in accordance with attached sketch have been in service for a number of years and are still in good condition, would lead your Committee to recommend splicing of center sills in accordance with the above practice. Furthermore, it has been the observation of members of your Committee that there has never been a failure where center sills have been spliced as recommended, and if the restrictions placed upon same, as suggested, are followed it would seem that there should be no objection to permitting the splicing to be done.

Rule 65-A, Page 20.

Add paragraph to read as follows: "*Steel sills may be spliced as shown below. (Show sketches 'A,' 'B' and 'D,' M. C. B., Sheet G.,* 1905 *Proceedings*)."

Inasmuch as the M. C. B. Association has adopted a Recommended Practice for splicing of steel sills, and since this is practiced by all owners of steel car equipment, your Committee believes this practice should be allowed in the repair of cars damaged in interchange and thus avoid the expense of cutting out the entire sills which would seem to be unwarranted, and therefore submits the above addition to Rule 65 for consideration.

Rule 68, Page 20.

Your Committee recommends that the *mounting pressure of wheels* for different size of axles and material in wheel hubs should be looked into with the view of establishing a Recommended Practice and later be included in the Rules of Interchange.

Rule 75, Page 21.

Change to read: "*When two or more cars chained together and couplers blocked out with metal spacing blocks, or any cars which require switch chains to handle them, are delivered at* *an interchange point, the receiving road shall deliver to the delivering road at the time an equivalent number of switch chains and metal spacing blocks of the same size as the chains and metal spacing blocks so used on the cars delivered, or, in lieu thereof, furnish a defect card for such chains and metal spacing blocks.*"

Wooden spacing blocks used between the coupler horns and steel end sills crush, causing twin and triple shipments of lumber and especially structural material to become disarranged en route, which necessitates the use of metal spacing blocks. With no provision in the rules at present to provide for the return of these metal spacing blocks the road delivering load must either delay freight at interchange point or lose the cost of the block. Your Committee, therefore, recommends the addition of the metal spacing block to the above rule.

Rule 76, Page 22.

Add after the word "*timbers*" in fourth line the following: "On *wooden cars; and on steel cars to card-board located either on cross-tie under car or on inside of side sill at the end of car.*"

The same explanation applies as in Rule 5.

Rule 89, Page 31.

Add the words "*Cast iron*" in first and second lines of table before the word "*Wheel.*" Also add the following paragraphs to this rule: "*All steel or steel-tired wheels of the different makes to be charged at current market prices.*"

"*Removing, turning and replacing a pair of steel or steel-tired wheels;* $5.50 *for pedestal type of truck and* $5.00 *for arch bar truck. Loss of service metal from steel or steel-tired wheels, for defects for which the delivering company is responsible, to be charged for at the rate of* $1.50 *per* 1-16 *inch thickness of tread or tire.*"

The above recommendation is made to conform to previous suggestions covering the introduction of steel and steel-tired wheels into the Rules.

Rule 94, Pages 32, 33, 34 and 35.

First and second items on page 32 relating to "1 1-4 *inch air brake hose.*" Omit *dimensions* since air brake hose applied to foreign cars must be M. C. B. standard after July 1st, 1906, as provided for in Rule 71.

Third and fourth items relating to "1 *inch air brake hose*" to be omitted, since none but standard hose can be used in repairs.

"8 *inch by* 12 *inch air brake equipment*" to be eliminated from Rules, since these are manufactured articles with listed prices, otherwise it would be necessary to add the 10 inch by 12 inch air brake equipment and further details of the different kinds and styles of valves.

"*Coupling, dummy*" eliminate from rules since they are no longer used on freight equipment.

"*Coupler, M. C .B., malleable iron*" omit all charges and credits for malleable couplers on account of specifications having been adopted as standard stating that couplers must be made of steel, and Rule 59 specifying that "When using materials for repairs to foreign cars for which the Master Car Builders' Association has adopted specifications as a standard, the materials must comply with the requirements of these specifications."

Add price for "*Coupler locks, complete, charge* 35 *cents, scrap credit* 5 *cents.*"

The above would seem a fair average price for all coupler locks and would considerably facilitate billing.

"*Labor per hour*" increase from 20 to 22 cents.

Add price for "Pipe, 1 inch, per foot."

Rule 98, Pages 36 and 37.

Change last sentence in first paragraph to read "*The receiving road shall at once authorize counter bill to cover acknowledged error, said authority to be attached to bill when rendered.*"

Second paragraph, line 6, substitute for the last clause in this sentence after the word "*given*" the following: "*Correct number shall be furnished or authority given for counter bill to cover the error.*"

The above recommendations are made with a view of changing the rule to conform to present day practice since offset defect cards are furnished in lieu of letters of authority; and in place of allowing credit on next month's bill, which is impracticable, defect cards for overcharge are given.

Rule 102, Page 37.

Add after this paragraph: "*Except for parts of malleable iron couplers which must be credited as scrap.*"

Rule No. 106, Pages 38 to 43.

Recommend changes in the following:

"*Coupler, with pocket attachments, etc., 4 hours.*"

"*Draft timber extending to body bolster, one replaced, 6 hours.*"

"*Draft timber, extending to body bolster, one replaced when its center sill has been replaced, 1 hour.*"

"*Draft timbers extending to body bolster, two on same end, replaced, 9 hours.*"

"*Draft timber, extending beyond body bolster, one replaced, 9 hours.*"

"*Draft timber, extending beyond body bolster, one replaced when center sill has been replaced, 1 hour.*"

"*Draft timber, extending beyond body bolster, two on same end, replaced, 12 hours.*"

Rule 110, Page 44.

Add after the word "*Dead Block*" in second line, the following: "*Or platform plank.*"

Inasmuch as no additional labor is involved in renewing platform plank when end sill is renewed, your Committee would recommend that this item be treated the same as the dead blocks, for which no additional labor is charged when the end sill is renewed.

Rule 113, Page 52.

"*All steel car bodies to be settled for at price per pound less depreciation.*"

On account of the different lengths of all steel car bodies and the various designs of steel cars varying considerably in weight, dependent on the kind of service for which the car was built, your Committee is of the opinion that settlement prices should be based upon the gross weight of car bodies at a fixed price per pound, less the usual depreciation. This would more equitably cover the lighter and heavier constructed cars of the same length and type.

Rule 114, Page 53.

"*Depreciation of all classes of trucks to be reduced from 6 to 5 per cent per annum.*"

On account of trucks receiving more attention in the way of repairs, and the different parts renewed more often than any other part of the car, your Committee recommends that the depeciation be reduced from six to five per cent per annum.

Rule 122, Pages 55 and 56.

Your Committee recommends that this rule be changed so as to include the return of metal body bolsters, in good condition, from cars destroyed. The road on which the car body is destroyed has no use for the metal body bolsters, and if returned with the trucks should receive the credit of $40.00 charged for cars equipped with metal body bolsters.

R. L. Kleine, Chairman.
W. J. Buchanan.
G. E. Carson.
S. A. Cromwell.
G. N. Dow.
S. M. Hindman.
W. J. Knox.
A. LaMar.
F. J. Reeve.
J. B. Swan.
H. W. Watts.
Committee.

PRESIDENT: There being no further business, we will proceed to the consideration of the recommendations made by our Standing Committee on M. C. B. Rules. They have made an excellent report, equal to any report that has ever been made, if not better. I am always interested in the subject, and I will take the liberty of calling our Vice President, Mr. Redding, to the chair tonight, with your permission.

MR. D. J. REDDING: I will ask the chairman of the Committee to read the rules and changes recommended by the Committee as they appear in the paper. Where there is no objection to the change recommended by the Committee we will pass on immediately to the next; where there is objection, any discussion that may be necessary can be brought forth as the particular recommendation is reached. Then we will pass on the whole after the entire report has been gone over.

Rule 10, Pages 4 and 5:

MR. F. H. STARK: This is a matter of considerable importance to car owners. All our representatives having cars of over 80,000 pounds capacity find that the service period of the wheels is very limited indeed, and this rule will condemn the wheels very much earlier than at the present time. We have had the credit of recommending a larger proportion of the changes which have been approved than any other railway club. I am satisfied that the railroads running in sections of the country less mountainous than ours will vote against this recommendation. Then, too, I believe that the majority of wheel flange failures under 100,000 lbs. capacity cars are under steel hoppers. There are a number of elements that would enter into that. In the first place, the load itself is increased, the tare of the car is increased, the center of gravity has been raised, the braking power has been raised; these all go to cause an increased friction between wheel flange and rail, causing heat, which causes these heat cracks. And I believe railroad men will bear me out in stating that a very large percentage of flange failures are found on wheels that bear evidence of flange wear. Occasionally a flange fails that is practically in its normal condition, but that is the exception. If a flange shows wear there is an indication of something wrong. The construction of the body bolster, or the truck bolster, or both, is weak, the car rides hard on the side bearings, which retards the free rotating of the truck. Then, too, the question of side bearing clearance is an important factor. The question of coupler lateral play cuts a large figure in the question of flange wear. These are all conditions that ought to be met in cars to be built in the future. But I hardly feel that it is right to increase the minimum thickness of flange under cars of larger capacity until after every other reasonable effort has been made. The Master Car Builders' Association has appointed a committee to confer with a like committee appointed by the American Railway Association on the subject of car wheels. This committee had a meeting on the 24th of this month and the Chairman of the Standing Committee on Cast Iron Wheels informed me that there was little doubt but what they will recommend an increase in the standard thickness of wheel flange. They have, from their investigations, concluded that it is perfectly feasible to increase the standard thickness of flange by 1-16″ at the present time.

If the Engineers of Maintenance of Way change their standard of throat clearance in the course of four or five years, the thickness of the flange can be increased again, in this manner obtaining a gradual increase of flange. I think that particular feature of the report should not be adopted at this time.

PRESIDENT: There is no doubt that this point will be fought pretty hard by some of the railroads who are not troubled with breaking of flanges to the extent the mountainous roads are. It seems to me this is a question that needs discussion at this time.

MR. R. L. KLEINE: Two years ago we made a similar recommendation and it was thought by your Committee that this recommendation is absolutely necessary from the standpoint of safety. The recommendation only covers 100,000 lb. capacity cars, which are giving us the most trouble from flange breakage. As Mr. Stark has stated, flange breakage under hopper cars seem to be most predominant; but it must not be lost sight of that we have more 100,000 lb. hopper cars than any other type of cars. A year ago the M. C. B. A. raised the limit for 80,000 lb. capacity cars 1-16″, making it at the present time 1 1-16″. Now the wheels under 100,000 lb. cars have always given a great deal more trouble than the 80,000 lb. And it is not alone in cases of heat cracks, but also where there are no heat cracks, but pieces are spalled off the flange, 4″, 6″ and 8″ long, especially when they get down below the 1 1-8″ limit. The western roads do not have 100,000 lb. capacity cars to the same extent as the eastern roads, and therefore will not be affected. On some of the eastern roads this 1 1-8″ limit has been in vogue for a year and a half and two years for their own equipment. The result is they have a different flange gauge limit for foreign equipment running over their lines. It was thought advisable to recommend the increase from 1 1-16″ to 1 1-8″ on the 100,000 lb. capacity cars, as the failures seem to be about equal under all classes of 100,000 lb. capacity cars, considering the total number of each kind in service.

MR. L. H. TURNER: I have not heard any figures yet which would tend to show that flange breakage is much greater under 100,000 lb. capacity cars than any others. Inasmuch as the standing committee on cast iron wheels have the matter under consideration, it would seem to me that any recommendation by our Club on this particular subject at this time would be rather anticipating the work of this committee. And I would move that this particular recommendation be passed until the Standing Committee on Cast Iron Wheels has made their report to the Association.

MR. R. L. KLEINE: I do not see that the reference of this question to the Committee on Cast Iron Wheels makes really any difference as far as the recommendation of your Standing Committee goes. It is a question of safety that is involved here. That Committee will no doubt make recommendations relative to the strength of the wheel, but this is a question as to the strength of the flange after it has been practically worn out.

MR. LE GRAND PARISH: I am only here as a visitor and I do not know that I am prepared to discuss this particular question. I believe, however, from my experience of railway clubs, that recommendations of committees are proper at any time. Even if the question be in the hands of a standing committee, the committee are usually very much disposed to learn the feelings of the railways clubs in any particular district for their general information.

The motion to pass this recommendation being put to vote was lost and the recommendation of the Committee was adopted.

Rule 10-A, Page 5.

CHAIRMAN: The practice of using steel wheels under heavy freight cars is being rapidly extended, and as the rules do not cover the cost of handling these wheels, the subject should be given full consideration. I recently saw a report of a test showing that the power required to shear off a steel flange was about five times greater than was required to shear a cast iron flange of like section, which would indicate that a steel flange 3-4 inch thick would be very much safer than a cast iron flange of 1 or 1 1-16 inch thick; and while it might prove a good investment for the owner of a car to remove steel wheels for turning, when flanges are worn to one inch and are still cutting, and thereby restore proper flange thickness and contour with the minimum loss of service metal, it should not be considered necessary to the safe running of the car for a foreign road to turn the tire, at considerable expense and delay to the car ,so long as the flange is more than 3-4 inch thick and not worn vertical.

MR. F. H. STARK: I want to commend the Committee on the fact that they have anticipated the use of steel-tired wheels. Heretofore the M. C. B. A. have been a little slow in anticipating changes in construction. For instance, before they adopted the standard axle many roads had axles of various dimensions in service, consequently it was a long time before we attained a standard.

MR. JULIUS KRAUSE: I am of the opinion it would be a good move to adopt something to guide the inspectors. Steel-tired wheels under freight cars are becoming more plentiful and car inspectors are beginning to inquire how long we can run them and should we use the M. C. B. wheel gauge on them. On this question of safety, while our Chairman 'states he run steel tires on locomotices with 3-4″ tires, I have had steel tires give out with flanges above 3-4″ thick; in fact, two steel-tired wheels broke under a car inside of a week, which showed some defect. I am of the opinion that minimum thickness of flanges for steel-tired wheels should be adopted.

MR. J. McC. BARWIS: The Pullman people have told us that they consider a steel-tired wheel safe at 3-4″. We have taken wheels out at 7-8″. I think the Committee's recommendation is along the right line. It is generally considered that a steel-tired wheel will stand more than a cast iron wheel with the same flange, but it is a question whether it will or not.

CHAIRMAN: As there is no motion to eliminate this clause, a motion to adopt is not necessary at this time.

Rule 19, Page 5.

Mr. F. H. STARK: I am not in position to discuss that question. I would simply ask the Chairman of the Committee if they know for a fact that cars of 100,000 lbs. capacity with slid flat wheels 2 1-2″ have actually caused broken rails, or whether they have found the wheels cracked through the plate or tread?

MR. G. N. DOW: I can say that the Lake Shore had not only one broken rail but several during a day at different times last year, and they were traced up and found to be due to flat wheels.

Rule 19-A, Page 5.

CHAIRMAN: I would like to ask the Committee if they have any record of steel or steel-tired wheels breaking on account of flat spots smaller than that which would condemn a cast iron wheel?

MR. R. L. KLEINE: We have never found, to my knowledge, that steel or steel-tired wheels have broken when the flat spot was 1 1-2 or 2 inches long. The limit on the road with which I am connected is 2 inches under passenger cars. But we have found steel-tired wheel broken under passenger cars with the 2 inch limit, and as freight cars will carry a greater load it was thought expedient to limit flat spots under freight cars to 1 1-2″. Of course the danger is greater when the tire gets worn down near to the limit of thickness.

MR. F. H. STARK: I would like to ask if the Committee took into consideration the advisability of removing the wheels earlier so as not to remove too much material in turning them?

Mr. R. L. KLEINE: The thought was that railroad companies who go to the expense of placing steel or steel-tired wheels under freight cars would certainly set a higher limit of thickness than one inch in order to get the most economical tire wear. The M. C. B. limit was set at one inch in the first place so that the wheels would be removed by the home company, thus reducing the removals of tires on foreign roads to a minimum.

MR. H. W. WATTS: I would like to call attention to the passenger rules on page 75, for a flat spot of 1 1-4″. With a heavier load to sustain we have given them 1-4″ more than that.

CHAIRMAN: It is a fact, however, that passenger wheels are run at a higher speed. It might not be amiss to say that I have known of a number of cases where flat spots two or three inches long, on steel and steel-tired wheels, were cured without removing the wheels and turning them. This is done by drilling one or more half inch holes about one-half inch deep in the flat spot, dove-tail them and drive in pieces of soft steel which project slightly above the surface; flatten these down with a hammer to about 1-8" above the contour of the tread; after the wheel has made a few revolutions you will never know you had a flat spot. This has been done on tired wheels and can be done with absolute safety on solid steel wheels, thereby saving the cost of removal, turning and loss of service metal.

Rule 60, Page 17.

MR. JOSEPH DYER: I cannot understand the necessity for this. Specifications having been given for brake beams, a brake beam is just as much standard as a coupler. As far as I know, inspectors now equip repaired cars with one brake beam that was formerly equipped with another, so it is standard.

MR. R. L. KLEINE: The M. C. B. A. has adopted a standard in regard to the number of pounds, 7,500 or 12,000, depending on the weight of the car; but it has not adopted general specifications, and foreign roads will not accept interchanged brake beams. This question has been up repeatedly before the Arbitration Committe and they did not concur in the recommendation, but your Committee thought it ought again be brought to their attention. It would certainly relieve roads from carrying a large number of brake beams in stock.

MR. JOS. DYER: I know this has been up before, but I understand they passed it by because they said it was unnecessary, and not because they did not concur.

MR. JULIUS KRAUSE: This week I had a bill returned from the New York Central, where I had had replaced a Simplex with a National Hollow Brake Beam, and I was obliged to issue a M. C. B. defect card for wrong repairs. I believe the Committee is right in recommending this, so we can have a clear understanding.

Rule 65, Add Fig. 9-A.

MR. JULIUS KRAUSE: This Committee says they never saw a center sill give out that had been spliced. I have been inspecting cars for 35 years and I never saw a spliced center sill that gave out; but I might add that I have not come across a spliced center sill on freight cars. A splice two feet back of body bolster would be all right, I have no doubt, provided the end sill and body bolster were sound and car provided with through rods; especially where road is level and locomotives of lighter class. But when a train consists of 75 empty cars crossing a mountain the service is severe, and wooden center sills without splices I do not consider too strong.

Rule 75. Page 21.

VOICE: Mr. President, I would like to ask how you are going to compel these men to put metal spacing blocks in?

MR. R. L. KLEINE: That is a question which will work out itself. I believe it will be necessary for railroad companies to furnish these metal spacing blocks, and if these are protected in interchange they will stay on your road and be returned; but if they are not protected you are out a metal spacing block every time a twin load goes off your line. Roads far distant will not at the present time issue defect cards for these metal spacing blocks. They are equally important to the switch chains and should be included with them.

MR. DYER: At interchange points there are some stations where the inspector of the delivering road does not see the shipment when it goes off their line and it would be only by correspondence in that case that you could get a defect card. It seems to me the better way would be to arrange for the return through the agent of the line where the shipment will be delivered, have it charged against the shipment and billed against the road delivering the shipment.

MR. JULIUS KRAUSE: I have had some experience with metal spacing blocks. If you write the letters referred to, in the course of a week or two you will get a reply which generally is: "We have not noticed your spacing blocks. Your letter reached us too late. The cars referred to have no doubt returned to you with the spacing blocks still on." This is not satisfactory.

MR. L. G. PARISH: Several years ago we were manufacturing about 400 chains a year and we tried to find out where those chains were going. We kept a chain card and when we placed chains on a car we tacked the card on the car. When the delivering safety inspection is made they take a record of this card, or take the card off and send it to the division office, and they make requisition of the receiving line for defect card or the return of the chains. These cards are checked up from time to time. It occurred to me that it would be very easy to include spacing blocks on this card.

Rule 89, Page 31.

MR. H. H. ANDERSON: I would like to ask if the steel wheel is put on the same basis as the steel-tired wheel in that price of $1.50 per 1-16″ of service metal? The price of steel and of steel-tired wheels is altogether different, and should there not also be a difference in the charge for this?

CHAIRMAN: A 33 inch steel wheel with rim 2 inches thick can be bought for $20. It will weigh 700 lbs. new and scrap at 500 lbs. The M. C. B. scrap value is $3.75, which, subtracted from $20, would make the net price $16.25. The thickness of rim when scrapped would be 3-4 inch, giving you 1 1-4 inches of wearing metal at a cost of 81 cents per 1-16 inch of wear.

MR. JULIUS KRAUSE: What does the gentleman figure as the cost of steel tires?

CHAIRMAN: A 33 inch steel tire for one of the standard makes of wheel centers costs new $24.40. The amount of wearing metal is 1 3-8 inches and scrap weight 200 lbs., value $1.50, making cost of tire $22.90. When you add the cost of cutting off retaining rings, many of which are broken in removal, removing old tire, boring out new tire with several offsets to suit retaining rings, making new retaining rings, with labor of applying the tires, rings, bolts and rivets, you have an average net cost of about $28.00, or $1.27 per 1-16 inch of wearing metal.

Rule 94.

MR. F. H. STARK: I would like to ask Mr. Kleine what effect this will have on the credit allowed for good parts removed from foreign cars, originally equipped with malleable iron couplers?

MR. R. L. KLEINE: If this rule is adopted the credit for good second hand malleable parts removed will be scrap, and no road will be allowed to apply anything but a steel coupler to a car in repairs. Of course, it does not mean the malleable couplers can be taken from cars and steel couplers substituted, only in case of breakage.

MR. F. H. STARK: I believe the car owner should be given a reasonable length of time. It is only recently that steel has been adopted as a standard, and thousands of cars are equipped with malleable couplers. I am not particularly interested, as we are using steel couplers altogether, but it appears to me that this ought to be deferred until such time as malleable couplers are out of service.

MR. R. L. KLEINE: Up to last year the specifications for steel couplers has not been a standard. Since the Association has adopted the steel coupler as a standard, and with Rule 59 in your interchange rules, it will be necessary to strike out reference to malleable couplers, as no foreign road will be allowed to apply malleable iron couplers in repairs. We will have to either eliminate that part of Rule 59 or strike out the price for malleable couplers, as we cannot have both.

MR. DYER: I understand there is a specification for an M. C. B. brake shoe. If there is another style of brake shoe and the same kind is put in as is removed, can you make a bill for the article you put in, even though it is not standard? If you take out a malleable body and replace it with the same, can you bill? Is there anything in the rules against billing for the replacement of what the car owner is responsible for, where you put in exactly what the owner had in himself?

MR. R. L. KLEINE: The only question involved here is, if you apply an M. C. B. standard then that material must conform to the specifications of the Association, otherwise you cannot charge for it.

CHAIRMAN: The fact that specifications have been adopted differentiates this from the brake shoe question.

MR. F. H. STARK: Mr. Kleine is right. The adopting of the steel as a standard by the Association was rather a force measure to get the railroad companies into line. But there is a matter of equity as well. If a car is equipped with steel couplers it is wrong repairs to put on a malleable coupler; but if it was originally equipped with a malleable coupler the owner should not complain of a malleable coupler being applied. But if the malleable couplers are considered as scrap it is going to put a little premium on dishonestry. A railroad will soon get on hand a lot of malleable couplers which they will not want to put in the scrap pile. The temptation will be to put them on some foreign car, and in order to make a bill for it at 75 per cent of its original value the inspector will compromise himself and report same as an M. C. B. coupler. We are doing nobody any harm if we allow the railroads to put on a malleable coupler to a car which was originally equipped with malleable iron couplers, and charge the owner with 75 per cent of the value of a malleable iron coupler. There will be no harm done if the rules are allowed to stand as they are.

MR. R .L. KLEINE: But the question here involved is, if your malleable coupler does not break there is no injustice to the road that has the car equipped with malleable couplers; but if the malleable coupler does break in service, there is an indication that that coupler is weak, and the sooner we change that malleable iron for steel the better for all concerned. I cannot see that under the rules as laid down, since we have adopted standard specifications, and in view of Rule 59, we can do otherwise than strike out reference to malleable iron parts to be credited as second hand.

CHAIRMAN: The situation seems to be that you cannot put malleable couplers on foreign cars. If you cannot, you have got it on your hands, and it certainly is worth nothing to you but scrap.

MR. STARK: I believe we have gone through all the recommendations and that the Chairman has reflected the unanimous will of the Committee. We have not had any minority report or any objections on the part of the Committee. I believe the Committee are to be commended for the able manner in which they have considered the M. C. B. rules, and I move their recommendations be adopted.

The motion being seconded, was carried by unanimous vote.

MR. L. H. TURNER: I think this club should extend to this Committee a vote of thanks for the splendid work they have done, and also for the clear manner in which Mr. Kleine has explained the suggestions to us tonight.

The motion was duly seconded and unanimously carried.

MR. R. L. KLEINE: On behalf of the Committee and myself as Chairman, I desire to thank you for your hearty co-operation and your free and open discussion of the report.

ON MOTION, adjourned.

EDWARD KERR, President. ESTABLISHED 1891 W. R. BROWN, Treas. and Supt.

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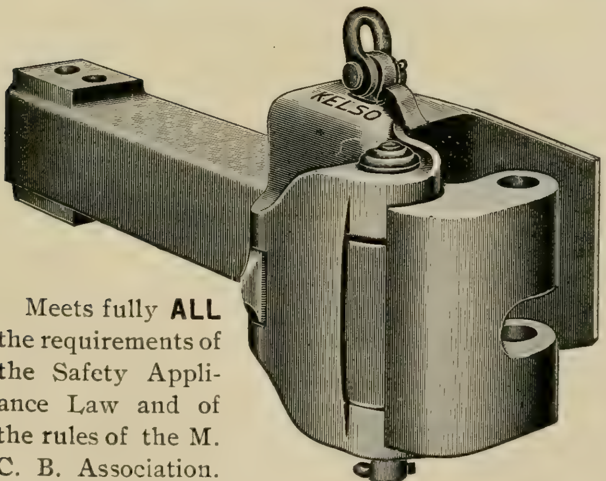

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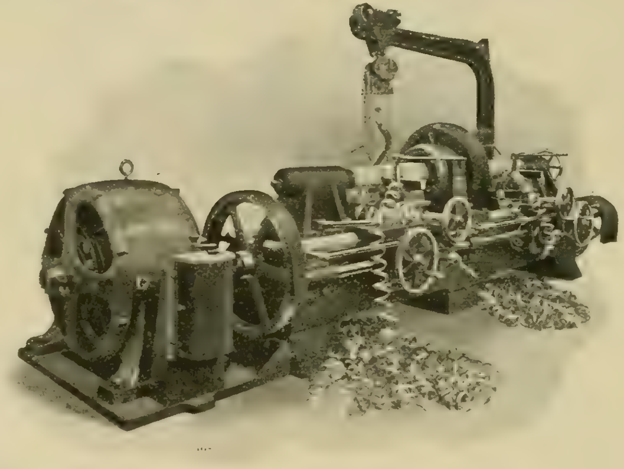

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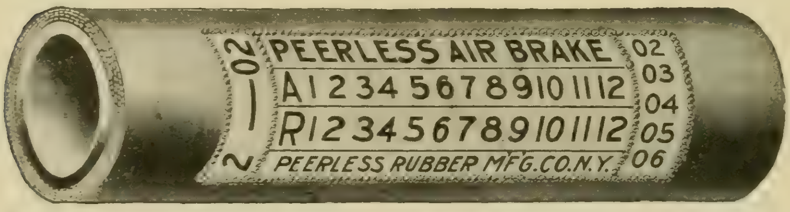
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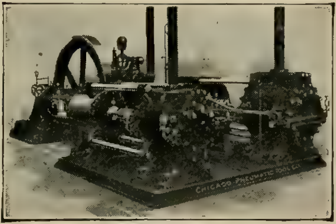

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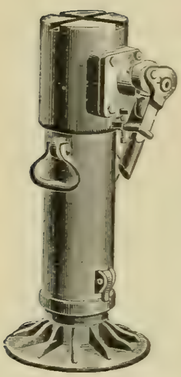
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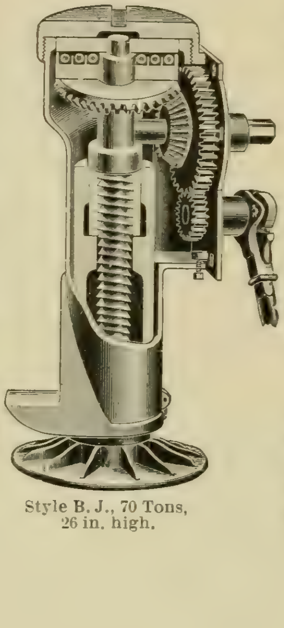
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of the

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ORGANIZED OCTOBER 18, 1901.

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VOL. V.
No. 7.

Pittsburgh, Pa., May 25, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

MAY 25th, 1906.

In place of the regular programme for this meeting a social session, at which the ladies were invited, was held, thus giving permanence to an idea which has been gaining in favor for some years, that at least one session of each year shall include the families (prospective and otherwise) of the members. The attraction this year consisted of an excursion to the large works of the Heinz Company in Allegheny, and was enjoyed by about three hundred members and friends of the Railway Club. Special cars were, through the courtesy of the Pittsburgh Railways Company, provided to take the Club out to the works, and there the party was met by some forty guides who conducted the visitors in small "units" through the plant.

The many machines and special mechanical devices for the saving of labor and time were of especial interest; but the feature of the great works which attracted probably the most attention was the sociological side of the business—for it is considered a part of their *business* to promote the welfare of the employees outside of working hours. The Covode House carries on a sort of neighborhood club, somewhat after the style of the "college settlement" work, and is in charge of a trained and salaried settlement worker. There are fully equipped dressing, bath and hospital rooms for both men and women, also with trained attendants, and large dining rooms where the women are provided with their lunch without charge, and a portion of the lunch of the men, the balance being charged for at a little less than actual cost. Then, in addition to a roof garden, there is a large auditorium, seated amphitheatre style, in which numerous entertainments, both of home and imported talent, are given throughout the winter.

In the women's dining room our party was presented to all 74 of the "57 Varieties," their number having been actually increased to 74, by young ladies brought in from the different departments, attired in the natty uniform of the Company's employees. If the formula from which this stage of the entertainment was worked out can be written, quality × opportunity = quantity, the second member of the equation left a big hole in the profits of the Heinz Company for the current year.

Following the collation, the party was ushered into the Auditorium where a short business session of the Railway Club was held.

PRESIDENT: Ladies and Gentlemen: We will not detain you with any lengthy order of business this afternoon, because we realize that this is a trip of pleasure. But there are a few matters that must receive our attention.

First, I am very much delighted this afternoon to introduce to you Mr. Howard Heinz, who will now address you for a few minutes.

MR. HOWARD HEINZ: Ladies and Gentlemen: It is a very great pleasure to me personally to welcome you here to-day. But I wish to express a deep regret that my father is not here to have this pleasure also, for he, like myself, is fond of the ladies. You doubtless recall that Admiral Schley once said that the only difference between a man and a woman was, that the man would have to become dead first before he could become an angel. Recently I met a man who did not quite agree with me about that, but of course his view is not to be counted, because the man who does not appreciate a true woman is not worth while paying attention to. However, he told a story which will bear repetition.

He was saying "Isn't it remarkable what different points of view people take on the same subject. In fact, you take people of different countries, they have such different ideas on the same subject."

To illustrate that, he said to me, that a man going along the Strand in London said to his companion: "Let us just stop a few of these folks and try this."

Well, along came an Englishman, and they said to him: "What would you take to spend the night up on top of St. Paul's?"

"I don't know, what would you give?"

"Never mind," the friend said, "an Englishman always wants to know all about a proposition before he goes into it."

Then along came a Scotchman, and they asked him the same question, "What will you take to spend the night up on St. Paul's?"

"Five hundred pounds."

There is a Scotchman, he always has a price and he gives it.

Then up comes an Irishman, and they said to him: "Pat, now we will settle this question. What will you take to spend the night up on St. Paul's?"

Pat thought a moment, and replied:

"Be jabers, I will take cold, sor."

You have had, unfortunately, very little opportunity to see much of this plant today in going through so rapidly, and being able to hear so little of what the conductors have to tell you. You will notice each room is roped off, as you were taken along at a rapid pace. This was done in order to get you through, because you might have become lost, or strayed, or been stolen if you had not done it that way. A friend of mine was allowed to go outside of my office and wander around through the factory. After he had been out about two hours we had to send a searching party out after him. After he got home he sent me this clipping, which I think will be interesting to you. It illustrates practically the directions we would have to give you if we sent you through this institution without a guide or if you were left to yourselves without any guiding ropes.

THE LUCID TRANSFER SLIP.

"Pardon me, sir," said the street railway passenger, turning to a gentleman in the same seat and holding out a transfer slip, "but would you be so kind as to explain for me the directions printed on the back of this?"

The gentleman took the transfer slip and read to himself: "Transfers must be made within one square of point where lines upon which passage is taken intersects with line to which transfer is made; or, if from this point both lines run for a distance upon the same track, then, at the passenger's option, he may ride to the point of divergence and then transfer—in either case, to the car for the passenger's destination first leaving the point at which he left the car upon which he took passage after the arrival at said point of the latter car."

Looking up from the ticket the gentleman said: "This seems to be simple enough. As soon as your first destination leaves the car get out and follow it; or, if the destination leaves the point at which you left the car, get a rain check. Do not take passage before the latter car arrives at said point. This forfeits your right to take the line to the divergence and transfer to the next destination unless you are on a parallel car, which, of course, is void after one square. In that event, you may sell your option and retire from the deal."

"Thank you, sir," was the grateful reply of the passenger. "But where do I get off?"

"How do I know?" somewhat testily asked the gentleman; "I am only the attorney for the company."

I am very glad we do not have to give you these directions in order to enable you to see some of the plant today. But I regret that you do not see more of it. And I will say this, that if you will come back again some time we will be glad to take you in smaller parties and show you more in detail what this institution contains.

In closing I only want to say that the key to this Auditorium is yours. You are here for a good time and we hope you will have it. Just as that Scotchman, who one time at a wake in Scotland said when he was very, very drunk on being told by a friend, "You must not be having such a good time, this is not a wedding, this is a funeral." "Well," he replied, "I don't care, whatever it is it is a great success." So we only hope for you that your afternoon will be a grand success.

MR. N. P. HYNDMAN: I would deem it proper at this time and at this stage of the proceedings to show our appreciation of Mr. Heinz and his associates in business, for the very excellent entertainment they have given us this afternoon at their works and in here. I move that a vote of thanks be extended to the Company for this most delightful occasion. And I also move that a vote of thanks be given to the Pittsburgh Railways Company in appreciation of the enjoyable ride they have given us this afternoon. And further, that the Secretary of this Club forward official notice of this action.

The motion being duly seconded and put to vote, was carried by a unanimous vote.

Under the regular order of business, Secretary Conway announced the following list of applicants for membership in this Club:

Gorman, M. J., Asst. Foreman Erecting Dept., Pressed Steel Car Co., McKees Rocks, Pa.

Irwin, Oliver, Passenger Conductor, Penn. Lines West, New Castle, Pa.

Kaup, H. E., Gen'l. Foreman Erecting Dept., Pressed Steel Car Co., McKees Rocks, Pa.

Kassler, A., Draftsman, Pressed Steel Car Co., Sheridanville, Pa.

Shoendorfer, Frank C., Eng. House Foreman, B. & O. R. R., New Castle, Pa.

Vanderveer, G. N., Wreck Master, B. & O. R. R. Co., New Castle Jct., Pa.

PRESIDENT: As soon as these names have been favorably acted upon by the Executive Committee the gentlemen will become members of this Club.

We can always depend upon our Secretary to provide entertainment for all occasions connected with the Railway Club of Pittsburgh, and I will now turn over the balance of the afternoon into Mr. Conway's hands, who has arranged for your further entertainment.

I might add that it has been suggested that another year we have a Railway Club banquet to which all the ladies would be invited, and it is quite probable that you can safely look forward to such a treat another year. Mr. Conway usually succeeds in arranging something each year especially for the "men folks," and I think we should at least once a year invite the ladies.

I will now turn the meeting over to Mr. Conway.

MR. J. D. CONWAY: Ladies and Gentlemen: We have prepared for this occasion a short entertainment programme, which we trust will add to your further enjoyment of the afternoon.

A musical treat was then presented, also monologue and a one-act skit by selected talent for the occasion, after which the Club adjourned and were then taken back to the city by special cars provided for the purpose.

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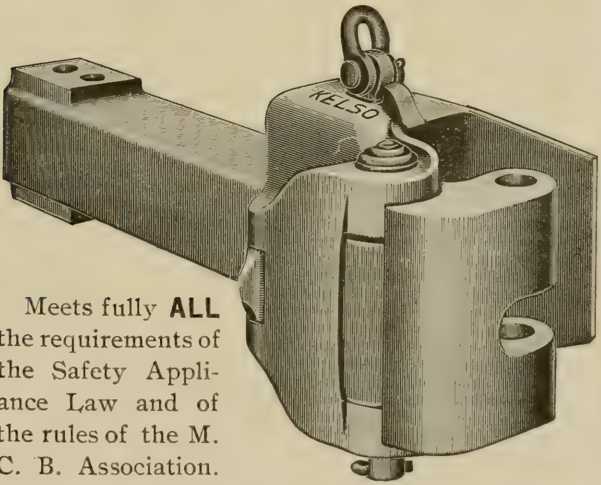

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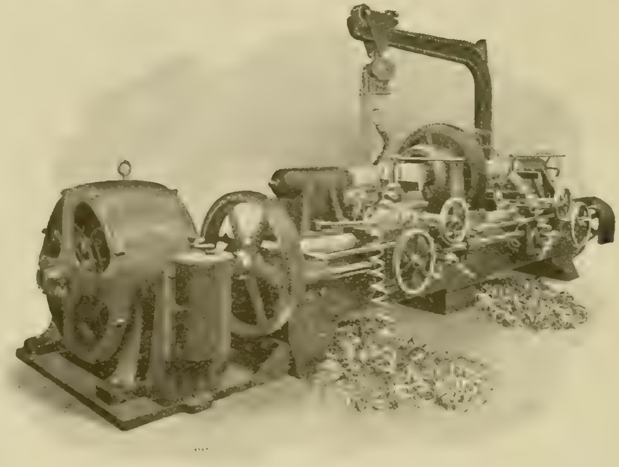

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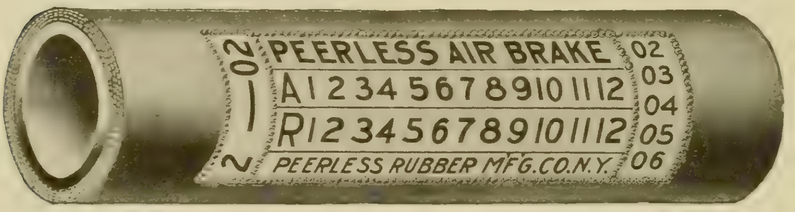
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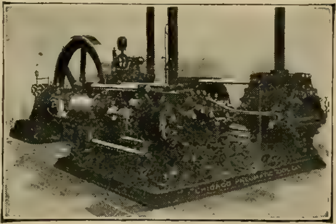

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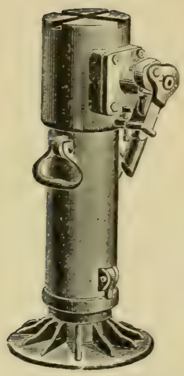

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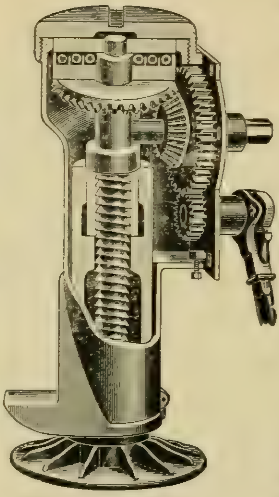

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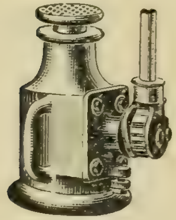

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VOL. V.
No. 8.

Pittsburgh, Pa., Sept. 28, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
SEPTEMBER 28th, 1906.

The meeting was called to order at the Monongahela House, Pittsburgh, Pa., at 8 o'clock P. M., with President F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Anderson, H. T.
Atwood, J. A.
Ault, C. B.
Barnsley, Geo. T.
Barwis, J. McC.
Bealor, B. G.
Bonsall, J. S.
Bowery, Fred.
Brand, Thos.
Brown, G. P.
Burrell, J. E.
Conway, J. D.
Coulter, A. F.
Cox, P. L.
Dambach, C. O.
Dawson, W. J.
Drayer, U. S.
Elder, Thos. W., Jr.
Elliott, A. H.
Ferguson, O. G.
Forsberg, R. P.
Gale, C. H.
Garland, C. W.
George, M. E.
Gormley, C. H.
Gray, Guy. M.
Hackenberg, J. H.
Harris, J. D.
Henderson, J. W.
Hill, M. H.
Howe, D. M.
Huyett, E. G.
Irwin, O.
Jefferson, E. Z.
Jennings, F. R.
Johnson, A. J.
Kaup, H. E.
Kennedy, Jas.
Kerr, Edward.
Kissinger, C. F.
Koch, Felix.
Knight, E. A.
Lace, Thos. C.
Lenhart, C. W.
Lobez, P. L.
Long, J. H.
Ludgate, B. A.
Mason, R. L.
Millar, C. W.
Miller, Geo. W.
Minor, H. C.
Mortland, W. G.
Murphy, W. J.
McCune, Frank.
McFeatters, F. R.
McIlwain, J. D.
McNulty, F. M.
Oates, Geo. M.
Orchard, Chas.
Peach, W. M.
Peacock, W. W.
Porter, H. T.
Porter, H. V.
Redding, D. J.
Rhodes, George P.
Roberts, Jno. R.
Rosenstock, J. H.
Ryan, W. F.
Severance, F. W.
Shadle, C. F.
Shuck, Wm. C.
Smith, D. W.
Soles, G. H.
Stark, F. H.

Stucki, A.
Suckfield, G. A.
Swann, J. B.
Swartz, H. E.
Tate, Ralph H.
Tucker, Jno. L.
Walker, Geo. W.
Wallace, M. E.
Walters, T. J.
Warne, J. C.
Warnock, H. R.
Watts, H. W.
Wendt, Edwin F.
Wilson, Geo. A.
Wilson, W. H.
Wilson, W. J.
Wood, W. B.
Wood, W. H.
Zelch, J. L.

VISITORS.

Barwis, C. W.
Brown, E. C.
Cote, Geo. M.
Crooker, Ralph, Jr.
Danforth, G. H.
Duff, Samuel E.
Earley, G. G.
Elliott, Geo. H.
Fay, F. L.
Ferguson, Wm. J.
Gauss, E. E.
Gerwig, O. L.
Harrold, A. E.
Hawk, Robert.
Hench, N. M.
Hinnes, J. E.
Hoopes, E. L.
Leary, E. B.
Lustenberger, L. C.
Morris, T. R.
McMurray, G. W.
Nagle, W. E.
Pollock, Geo. L.
Purdy, W. F.
Randall, E. J.
Richter, E. A.
Simmons, W. M.
Sisco, Gibson E.
Smith, Irwin B.
Williams, C. W.

PRESIDENT: Gentlemen, I am glad to greet you after a separation of two or three months and it would give me pleasure to shake hands with every man here. I assume that, of course, you have had three months of absolute rest, nothing to do but enjoy yourselves, and that you now have returned as members of the Club to be reunited by "ties of steel."

The following proposals for membership were read by the Secretary:

J. L. Atwell, Manager, Philip-Carey Mfg. Co., 333 Second Ave., Pittsburgh, Pa.

Jas. H. Baker, Manager, Solid Steel Tool & Forge Co., 1240 Palo Alto St., Pittsburgh, Pa.

Arthur Booth, Asst. to Purchasing Agt., Philadelphia Co., 435 Sixth Ave., Pittsburgh, Pa.

F. J. Foley, Manager, Railway Steel Spring Co., Pittsburgh, Pa.

W. J. Greer, Mgr. Pgh. Dist., Cleveland Pneumatic Tool Co., Bessemer Bldg., Pittsburgh, Pa.

G. G. Kendrick, Sales Manager, Machinists Supply Co., Pittsburgh, Pa.

R. E. Hoopes, Agt., Penna. R. R. Co., Donora, Pa.

John Kirkby, Mech. & Elec. Engr., The Grange Pilsley, Chesterfield, England.

Geo. L. Pollock, Pur. Agent, W. & L. E. R. R. Co., Wabash Bldg., Pittsburgh, Pa.

W. E. Porterfield, Genl. Yard Master, B. & O. R. R. Co., Benwood, W. Va.

W. C. Rae, Rep., Johnson-Peter Co., House Building, Pittsburgh, Pa.

E. J. Randall, Engr. M. of W., Union R. R. Co., Port Perry, Pa.

L. A. Stiles, Baggage Agent, P. & L. E. R. R. Co., General Office, Pittsburgh, Pa.

Chas. M. Trinler, Salesman, J. D. McIlwain & Co., 208 Third Ave., Pittsburgh, Pa.

G. W. Wildin Mech. Supt., Erie R. R. Co., Meadville, Pa.

President: I believe the next in order is the appointment of a Committee on Nominations. How shall this Committee be appointed?

ON MOTION the Chair is instructed to make the appointment of a Committee on Nominations.

The President appointed Messrs. D. M. Howe, Geo. P. Brown and F. J. McNulty.

PRESIDENT: Next in order will be the presentation of the paper of the evening by Mr. H. T. Porter, Chief Engineer of the Bessemer & Lake Erie R. R., on The Practicability and Life of Metal Cross Ties for Railroad Track Construction. And it gives me pleasure to introduce Mr. Porter.

Practicability and Life of Metal Cross Ties For Railroad Track Construction.

BY MR. H. T. PORTER,

CHIEF ENGINEER, B. & L. E. R. R. CO.

Mr. President and Gentlemen:—

I was requested to present a paper on the practicability and life of metal cross ties for railroad track construction. I have not been able to prepare an article on as broad lines as the title calls for, but have only endeavored to present in a simple way the experience of the writer with metal cross ties.

There is an ever pressing demand for the reduction of cost and an increase in speed and safety of transportation.

It is causing, from year to year, radical changes in the character of equipment and of the roads on which the equipment runs.

For the improvement of the roads, grades are being reduced, curves are being lightened, or eliminated, and in every practicable way the roadbed and track are being made more substantial.

In order to provide a more stable support for the track, they are providing wider and better drained roadbeds.

To secure a ballast of better supporting power, crushed rock of various kinds and of various sizes, gravel with various percentages of sand, and other natural and artificial ballast material are being tested.

To distribute the load and lower the unit of pressure on the ballast, rails of larger section are continually replacing those of smaller section.

Why is this? Because within the last 25 years the load per axle of car has increased from 12,000 to 36,000 pounds, of locomotives from 20,000 to 60,000 pounds, and in a few cases the axle load of cars has reached a much higher figure.

This increase in load, together with the increase in speed, has increased the demands upon the track from four to five times.

In the construction of the road, you note the improvement of the roadbed by making it wider and more stable by careful drainage, of the ballast by the use of better quality of selected material, of the rail by the use of larger sections.

Has there been any such corresponding improvement in ties?

I believe that any observer of new construction in the eastern section of this country will note that quite a percentage of ties are now being used which would have been rejected a few years ago as not being up to specifications either as to quality or size.

This, as is well understood, is due to the rapidly diminishing quantity of available tie timber, and a corresponding increase in the use of ties.

The short life of wood and the limited conditions under which it can be used have led to the use of steel in bridges.

For similar reasons steel freight cars are taking the place of wooden freight cars as fast as the car companies can produce them.

The era of steel coach equipment is rapidly opening, and it is the opinion of many that the substitution of steel passenger equipment may soon attain the same rate of progress as that of freight equipment.

You will note that the improvement in track has been in the roadbed and ballast under the ties, and in the rail over the ties, whereas the character of the ties is either no better or worse than it was years ago, when the work of the track was only about one-fourth of what it is now. The necessity for an improvement in the ties is undisputed, and the only question is, what direction shall it take? Shall the improvement come as it has done in bridges and in freight and passenger equipment, by the use of steel?

As bearing on this question, the writer will try in a simple way to state his experience in the use of steel ties.

During the fall of 1900 there was furnished to the Bessemer & Lake Erie Railroad about 1,100 steel ties, these were the Carnegie M-14 Trough section. During November and December about 750 intermediate ties were placed south of Osgood in a piece of 100 pound rail track where the alignment was a compound curve of 6° 30′ reducing to 3° 30′ followed by a 9° reverse curve. During the following March and April after the slotted angle bars were received, the joint ties were put in. The track was then ballasted in the usual manner with furnace slag. About one-half of these had an angle riveted on the under side at the center of tie, and the balance had an angle riveted on the under side just outside of each rail. The object of the angle was to hold the track in line. They caused some inconvenience in the final lining of the track after it was surfaced. At the time the ties were put in all trains ran over this track, but after May 1, 1902, southbound ore trains and a portion of northbound freights were handled over a new line running to the east, but the rest of the trains continued the use of this track. Trains were operated over the 9° curve about four years without resurfacing. On account of the soft roadbed portions of the compound curve did not run so long. These ties are still in and are giving good service, but are not as satisfactory as those used since.

During September, 1904, there were received about 1200 Carnegie I beam steel ties. During November and December, 1904, and January, 1905, 1000 of these were put in the track about two miles north of Euclid station, where the track was laid with 100 pound rails on white oak ties about six years old and ballasted with six or eight inches of slag. The ties were put in by the regular section gang and without any special provision for placing track in better condition than it was before. Additional ballast was not furnished, and as the space occupied by the steel ties was so much smaller than that occupied by the wooden ties, there was not sufficient ballast to half fill the track. Between November, 1904, and June, 1905, the road at this point was single track, and carried the entire tonnage of the B. & L. E. R. R. On this section southbound trains are assisted by pushers, and during a portion of the time pushers with 180,000 pounds on the drivers were used. After June, 1905, southbound traffic has been handled over these ties. The Supervisor reports that after the steel ties were put in on this curve he had much less trouble in keeping the track in line than he did before, notwithstanding it was hardly half filled with ballast. Considering that from November to June the pushers were backing up around this curve that this track held its line is very significant, the cause for which I have attempted to explain later.

Since then we have received 105,000 of these ties, about 70,000 of which have been placed in the track, to give them a thorough test under conditions existing on the B. & L. E. R. R.

Substantially all the freight of this road is handled on that part of the line between Conneaut Harbor and North Bessemer, which is 146 miles in length. The freight tonnage is about 10,000,000 net tons per annum, with an average haul of about 120 miles; the line crosses eight watersheds and as southbound 30 foot grades and over are operated with pushers, it has seven pusher districts, covering about 33 per cent of the road. The curves generally are from three to four degrees, though there are a number running from six to eight degrees. On the north 15 miles of this line engines with 225,000 pounds on the drivers and south of this engines with 160,000 and 180,000 pounds on the drivers are used in handling freight trains. As about 8,000,000 tons of freight is ore and coal, loaded so that the gross weight of car load runs from 136,000 to 144,000 pounds per car, producing a load of 34,000 to 36,000 pounds on the axle, and as 60 per cent of this line is still single track, you will note that the service is very severe.

This year we have made two changes in line, one a half-mile long and the other three and one-half miles long. In this work and on all second track work we use steel ties. On a portion of this work the track was laid with steel ties across a creek bottom and blocked up, and afterwards raised to grade by running onto it filling in 80,000 to 100,000 pound capacity cars, loaded to their full capacity, which was unloaded and used in raising the track. We are using these ties in new work under all conditions where wooden ties have been used, and find that, taking everything into consideration, it can be done with the same facility and convenience as with wooden ties. In maintenance work either steel or wooden ties, which ever happens to be on hand, are distributed. Steel ties are used in renewing, whether there be one, two or more ties in a place to be renewed, that is, they are used in the main tracks under all conditions where wooden ties have been used.

The wooden tie track in most general use in this country consists of timber ties laid at right angles to the center line at regular intervals, and of two rails running parallel with the center line, resting on the ties and secured thereto with track spikes. The spikes may be driven home from time to time, but they do not so remain, but lift up to a less or greater degree depending on the solidity of the track, so that the primary function of the spike is to keep the rail from moving latterly. Within the limits of ordinary vertical movement the rail is held down on the tie by gravity or the weight of the rail and its load. As a general rule, there is, though it be small, more or less play between the base of the rail and the spike. This is to explain that on account of this play, there is a lack of firm and intimate connection between the rail and ties through the spike, between adjoining ties through the rail, and between the two rails through the ties. On account of this lack of firm and intimate connection, the vertical forces of the load on the rail are not instantly distributed to the adjoining ties, nor are the latteral forces instantly distributed to the other rail and adjoining ties. The vertical load is conveyed to adjoining ties in succession, and the latteral forces or blows are only resisted by the latteral stiffness of one rail until the single rail has moved the amount of the play in the connection between the rails and ties, thereby allowing a movement which aggravates the latteral blows or forces. A rigid connection between the rail and tie will certainly assist in bridging the load and in distributing the latteral blows and forces to both rails and adjacent ties.

The joints or connections are the feature in which the steel cars and bridges to the greatest degree excel wooden ones, and in an all metal track construction you can obtain a superior connection between rail and tie.

In an all metal track you obtain not only the instantaneous resistance of both rails and adjoining ties to latteral blows or forces, but you have the friction between rail and tie made by the fastening in the joints in advance of and following those on which the load directly rests.

This rigidity in the track structure itself independent of the ballast accounts for the track on the 4° curve, where steel ties were laid in the fall of 1904, remaining in line without being filled and provided with a shoulder of ballast.

We have observed where steel ties are used that we obtain less wear and a more uniform wear of rails. This is accounted for by the better fastening, securing a better connection between rail and tie, preventing the rail from rolling and producing a latteral rigidity in the track structure independent of the ballast.

In putting up track it is first surfaced and then lined, the operation being repeated until the surface and line are satisfactory, when it is trimmed. No feasible track construction, as far as I know, has yet been devised where the track under heavy load and dense traffic will permanently remain in surface and line, and as surfacing and lining have to be repeated periodically, the design of the tie should be such as to make it adapted to this operation. The wooden tie with parallel top and bottom faces is well adapted, as you can line it within reasonable limits without throwing the track out of surface; the only ballast which prevents lining is that at the end, which can readily be removed and replaced when lining is completed. The failure to recognize that the form of the tie should be such that the track can be lined without throwing it out of surface has made numerous designs otherwise good not practicable for use. This brings us to the conclusion that a tie with straight sides in general, with distortions to resist movement in ballast, so located that the ballast obstructing the movement can readily be removed before and after the lining has been done, is best adapted to track conditions.

The life of wood white oak ties under heavy traffic ranges from four years on sharp curves to eight or ten years on tangents. There is a wide difference in the durability of timber, even when it is the same kind taken from the same piece of woods. It is beyond the ability of inspector or trackman to select ties that will give the same duration of service. The tie begins to deteriorate from the time it is put in place, the rate of deterioration increasing until it becomes necessary to remove the tie. There is no track work that compensates fully for this deterioration, so you cannot maintain a condition equal to an all new tie track.

The steel tie maintains its section and the bed under the tie does not have to be disturbed on account of tie becoming soft, nor on account of the effective thickness of the tie becoming less due to rail or tie plate bedding into the tie. The steel tie up to failure retains the same dimensions and efficiency, reducing the work required for surfacing and lining, and it is possible throughout the life of the tie to maintain track of the same excellence as with all new ties. Up to the present time we have only had one broken rail on steel ties and the report attributes this break to a flaw in the rail.

We have not used steel ties long enough to determine their life under our conditions, but an examination of a broken tie after six years' service does not indicate that rusting under ordinary conditions should cause any anxiety. I somewhere read a statement that Mr. Post, Chief Engineer of the Neitherland State Railroad, found that ties weighing 125 pounds laid in sand and gravel ballast had decreased 8¾ pounds in 35 years, but were still good for 20 years' service.

Not having begun the use of automatic signals, I have not made any test of insulation, but am advised that effective insulation can be made without impairing the connection between rail and tie.

Steel ties have been furnished to the supervisors and section foremen, and they have been asked to freely criticise them. Whereas they do not claim that steel ties perfectly meet all conditions, they want steel ties whenever they can be furnished.

We have stretches of track laid with all steel ties up to 4.4 miles in length, and find that after the track is filled with ballast there is a very appreciable reduction of noise in general and at the joints below what can be obtained with wooden tie track.

Take any period of five years and the Interstate reports show that tie renewals are from two to two and a half times the cost of the renewal of rails. On the assumption that the steel tie can be produced at the same price per pound as the steel rail, and that the life of the steel tie will be one and one-half times that of the steel rail, the cost of tie renewal would be about equal to that of rail renewal. Experience in Europe and observation from our own experience here indicate that a longer life will be obtained. The possible reduction of cost of tie renewals to the same cost as rail renewals shows the great economy obtainable from the use of steel ties. A portion of this reduction is due to being able to sell the old tie for scrap for 40% to 50% of its original cost.

I have attempted here to make a fair and simple statement of our experience, and will conclude with saying that we expect to continue the use of steel ties in maintenance and in new construction work on a still larger scale.

PRESIDENT: Gentlemen, this is a subject of most importance, something that railway managements have to confront; and it is through the medium of railway clubs and organizations such as ours that such information is accumulated. I trust many will take part in the discussion. I will ask Mr. Watts to open the discussion.

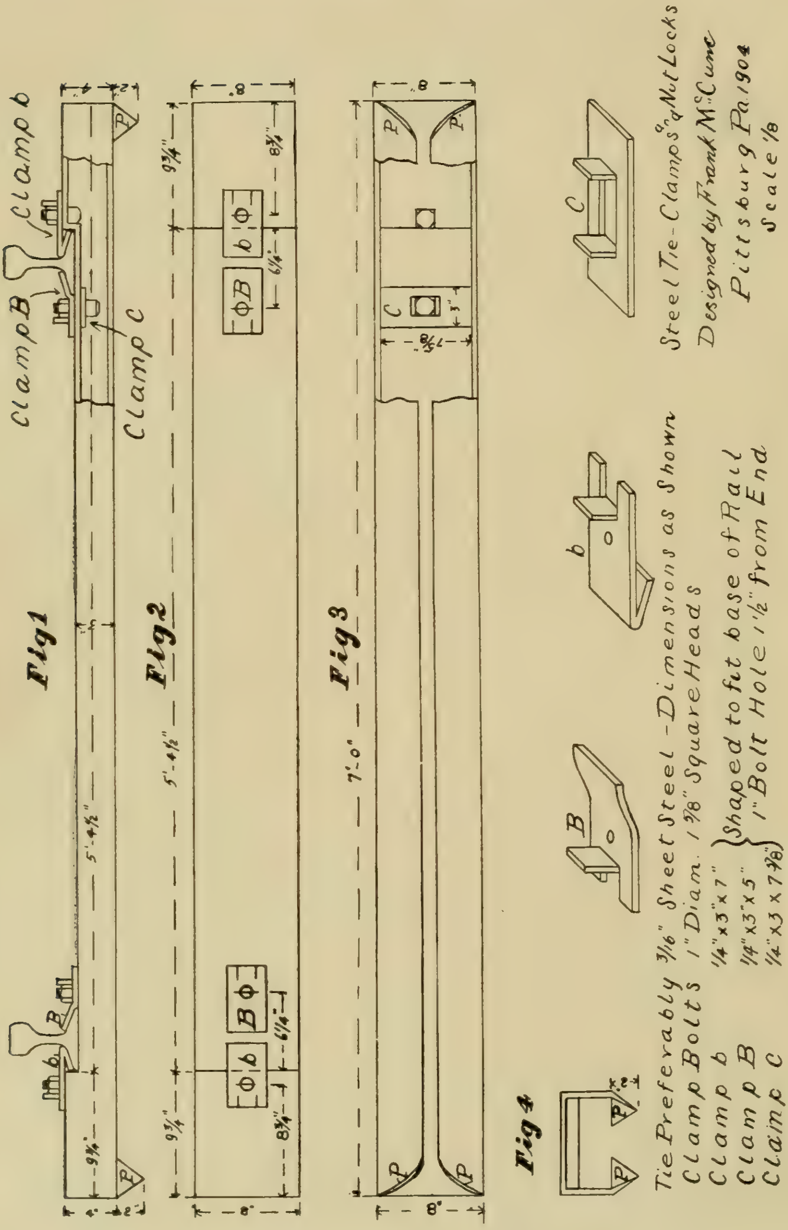
MR. H. W. WATTS: Mr. President: I am scarcely prepared to say much about steel ties in general, but following up Mr. Porter, I should like to say a little about the McCune tie. In connection with the transition period from wood to steel, I suppose there is not a more fascinating subject to railroad men than this one of steel ties. But the very fact that it is so interesting has flooded the Patent Office with designs, many of which are impracticable mechanically, on account of faulty design, or commercially impracticable, on account of the excessive cost of constructing or keeping them up. I was some time ago called upon to go through quite a number of patented designs and this fact was impressed upon me. I believe that the reason of this is that inventors frequently lose sight of the fact that our best mechanical inventions usually come to us through a process of evolution or development; a practical man, for instance, takes a mechanical appliance, and recognizing the essential features and retaining them, improves and develops them until the article assumes a much greater value than it originally possessed.

Permit me to read very briefly from Mr. Porter's excellent paper, bearing in mind what I have said in this connection:

"No feasible track construction, as far as I know, has yet been devised where the track under heavy load and dense traffic will permanently remain in surface and line, and as surfacing and lining have to be repeated periodically, the design of the tie should be such as to make it adapted to operation. The wooden tie with parallel top and bottom faces is well adapted, as you can line it within reasonable limits without throwing the track out of surface; the only ballast which prevents lining is that at the end, which can readily be removed and replaced when lining is completed. The failure to recognize that the form of the tie should be such that the track can be lined without throwing it out of surface has made numerous designs otherwise good not practicable for use. This brings us to the conclusion that a tie with straight sides in general, with distortions to resist movement in ballast, so located that the ballast obstructing the movement can readily be removed before and after the lining has been done."

In designing the McCune steel tie the inventor has kept these pertinent facts in mind and you have here a tie with straight sides (showing sketch) with two projections at each end to resist movement in ballast. The tie is constructed in the form of a box girder, the top surface of which is depressed one inch; the depression extending each way from the center a distance equal to that between the outside rail flanges when in place. This forms shoulders which act as rail braces, preventing the rails from spreading. The rails are held in place by clamps and bolts, the clamps also acting as nut locks. An experimental lot of these ties were made and placed in service a little over a year ago, on the main tracks of the Monongahela Connecting R. R., under exceptionally heavy traffic, with cars some of which carry 60,000 lbs. on each axle, instead of 36,000 lbs., mentioned in Mr. Porter's paper.

This lot was made from 3-16 sheet steel because they had to be made by hand, with the assistance of a steam hammer, and heavier steel could not be handled with these limited appliances. But I may say that a machine is about to be built which will press the ties out of 5-16 steel. However, the fact that the ties as they are have stood up under such heavy traffic, speaks well for the strength of the design.


Clamp b
Clamp B
Clamp C
Fig 1
Fig 2
Fig 3
Fig 4
P
b
B
C
4"
2"
8"
9¾"
8¾"
6¼"
5'-4½"
7'-0"
3"
Tie Preferably 3/16" Sheet Steel - Dimensions as Shown
Clamp Bolts 1" Diam. 1 3/8" Square Heads
Clamp b ¼"x3"x7"
Clamp B ¼"x3"x5"
Clamp C ¼"x3x7 3/8"
Shaped to fit base of Rail
1" Bolt Hole 1½" from End
Steel Tie - Clamps & Nut Locks
Designed by Frank McCune
Pittsburg Pa 1904
Scale 1/8

McCune Steel Tie.

Should further information be desired, I will try to answer any questions which may be asked.

MR. GEO. T. BARNSLEY: I had the pleasure and satisfaction of making two trips over the Bessemer & Lake Erie R. R. with Mr. Porter. I have observed in practice all that he has explained in his paper, and I can say that it is a great success. The track foreman handles everything with the same ease and with the same men that he would use in handling wooden ties. In this age it is a very important matter that you do not need specialists to go on the track to do the work. I fully endorse all that Mr. Porter said. I have seen the steel ties in use; I have seen the sections of track where the experiments were started; I have observed the steel ties going into new construction work. As compared with other forms of steel ties which I have seen, the tie described by Mr. Porter is the best form of practical tie that has been put into use.

MR. J. A. ATWOOD: The P. & L. E. R. R. up to the present time has not had any experience in the use of steel ties. We recognize, however, that the weakness in the track is largely in the ties. Our track has developed, as Mr. Porter has said, in many other ways to a much greater extent than it has in the matter of its ties. I think it very desirable that we get accurate and careful information as to better methods of connecting our rails together.

Of course, the principal difficulty the P. & L. E. would be up against in adopting steel ties is in the insulation. Our road is equipped with the automatic block system for the entire length, and we are somewhat fearful as to what the result is going to be from the use of steel ties. A wooden tie affords an absolute block to a current passing from one rail to the other, but a steel tie, instead of presenting that block, offers an inducement to the current to jump from the rail to the steel tie and so to the other rail. The insulation that has heretofore been provided for this purpose is small, possibly 1-8 inch in thickness, and in wet weather when the current is likely to seek new channels readily, and when there may be fillings on the rail or other obstructions connecting the steel rail with the steel tie, there is very considerable likelihood that we may have some additional difficulty with our block systems on account of the use of steel ties. And when we remember that a steel tie offers 5,000 additional points of insulation for every mile, it comes to be quite a serious proposition. Unless the insulation can be taken care of thoroughly and completely, the use of the steel tie will add very materially to the cost of maintenance of our block systems, and possibly, which is much more serious, cause difficulty in the continuous service of the signal system, and we cannot afford to have the signal system going wrong. We also anticipate much more trouble in locating the difficulty when there are at least 5,000 additional points of insulation for every mile. And when we do locate the point of difficulty it is very likely that we will have to send for the section foreman and trackmen in order to have the difficulty remedied. There are many difficulties that we are anticipating on this account.

With reference to the use of the steel tie, irrespective of the block system, I have always anticipated considerable trouble in the winter time when the tie is frozen solidly in the ground. We have a rigid fastening between the rail and the tie, and I have anticipated that the wave motion which we see in the track and in the rail ahead of a locomotive would set up some severe strains, possibly sufficient to strip the nuts from the bolts and destroy the fastenings, and in so destroying the fastenings destroy also the insulation. I would like to hear especially from Mr. Porter or any one else who has had experience in that line what trouble they have had in that respect.

There is one other point I wish to call attention to, and that is the comparative cost of the use of wooden ties as against steel. I have a little statement here which I have made, which was gotten up very hurriedly, but I think will give a fair idea of the comparative cost. I have assumed that a wooden tie will last an average of eight years. I think that is favoring the steel tie. And I have figured the cost for periods of eight years, and at the same time I have subtracted from the cost of maintaining the steel track for each period, the value of the scrap steel, there would be in the ties, supposing the tie was used up at that time. The results are as follows:

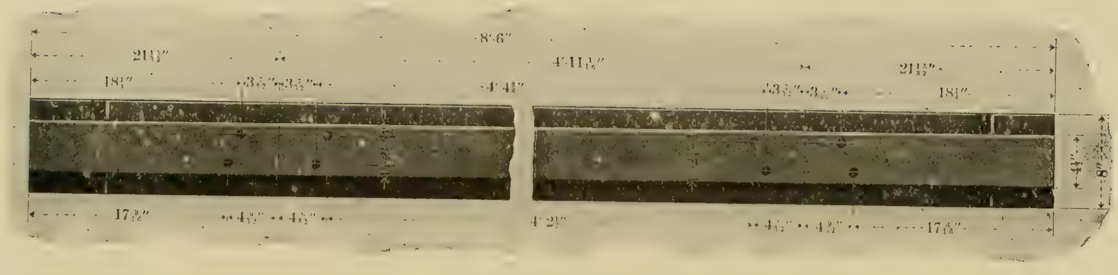
Net cost at the first period of	Wooden Ties	Steel Ties
8 years	$ 3,754	$6,200
16 years	7,300	6,840
24 years	10,846	7,480
32 years	14,392	8,100
40 years	17,950	8,760

So it appears that the period when steel ties and wooden ties are about the same cost would be about the end of 16 years. So that so far as concerns the mere cost of steel ties compared with wooden ties, we would not get any advantage under sixteen years in the use of steel ties. But, of course, many other things are to be thought of besides mere cost. If there is a large advantage on account of stability in service and safety by the use of steel ties over wooden ties, of course the steel tie is what you want. The railroads want perfect track as nearly as possible, and we can afford to pay whatever it costs to get the best track. Therefore if the steel tie will provide that, the steel tie is what we want.

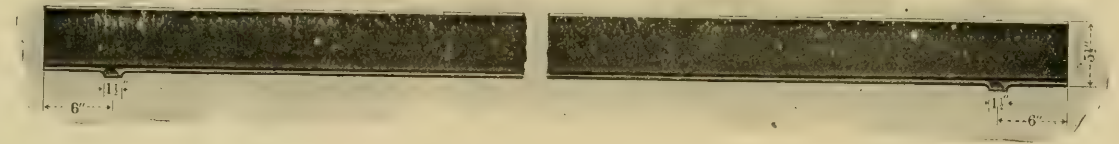
PRESIDENT: Mr. Brown, Chief Engineer of the Carnegie Steel Company, might tell us something about steel ties.

MR. E. C. BROWN: The manufacture of steel ties is out of my department. There is a man here who represents our company who will perhaps be able to give you some information about insulation, Mr. Hench.

MR. N. M. HENCH: Mr. President and Gentlemen—The insulation of a steel tie is taken care of by the use of a fiber shim beneath the rail, 4½" wide, 12" long and 5-16" thick. The steel clip used in fastening the rail to the tie is made up by a combination of fiber and malleable iron bushing placed in such a manner that the fiber gets no wear from the bolt. A glance at the illustration will readily show that the only wear that can occur is on the fiber beneath the clip and rail, and while this has not been in service a great while, it has furnished perfect insulation and shows no deterioration. Mr. Porter, when first placing steel ties in track in 1900, used quite a number of fiber shims beneath the rail, and I noticed last year that they were about worn out, so that we have reason to believe that four years' life can be gotten out of the shim. It is very

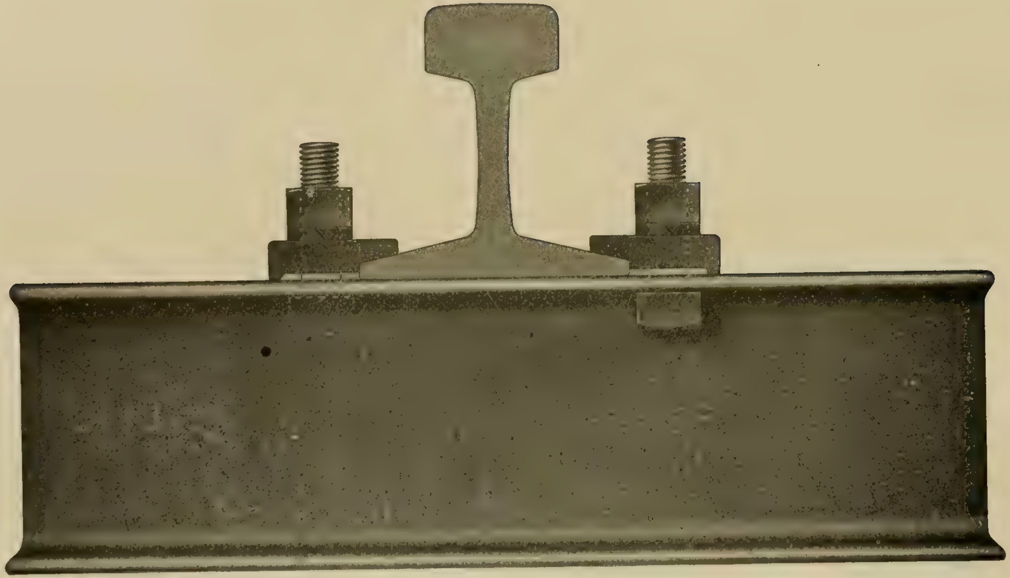


Top View of Tie.
Gauge—4' 8½" for 85 lb. A. S. C. E. Rail.

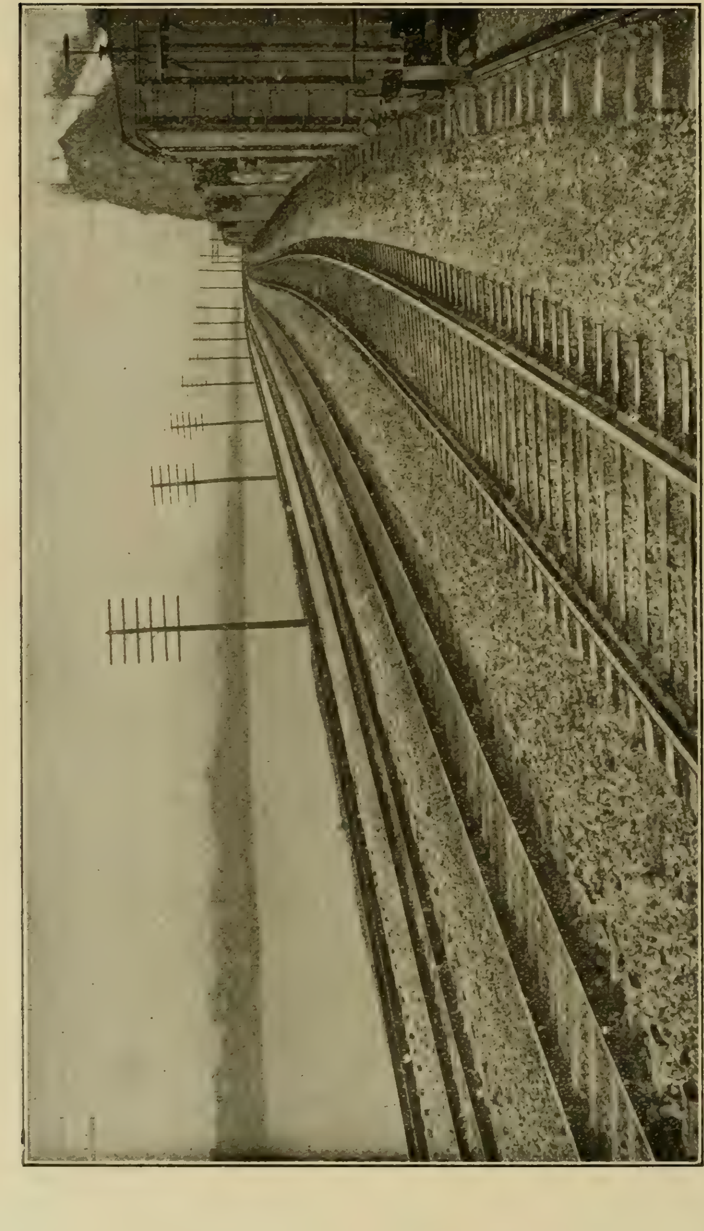


Side View of Tie.

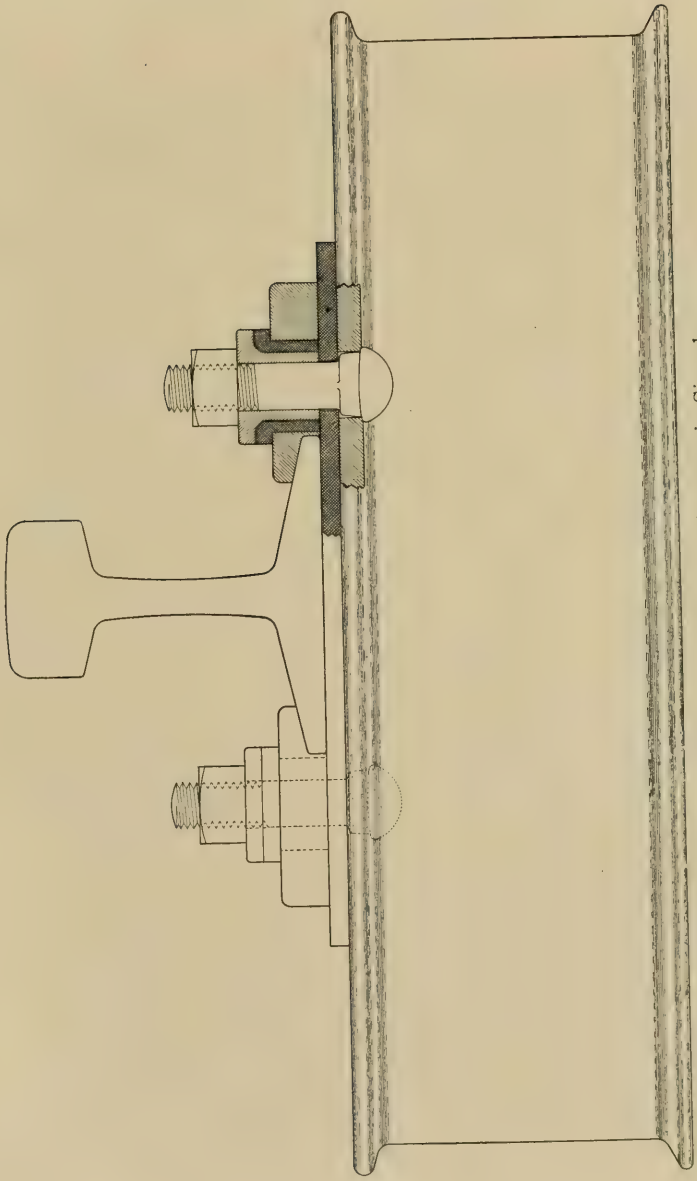
The inner holes in above group take care of rail fastenings and the outer the joints. In cases where splice bars are made with sloth sufficiently wide to admit the clips, the inner group of holes will take care of the rail in use when ties are installed, and the outer can be used for a heavier rail. The indentation in the base is designed to resist lateral motion.



Section showing Intermediate Fastening where insulation is not required.
Joints with wide slotting use above fastening also.

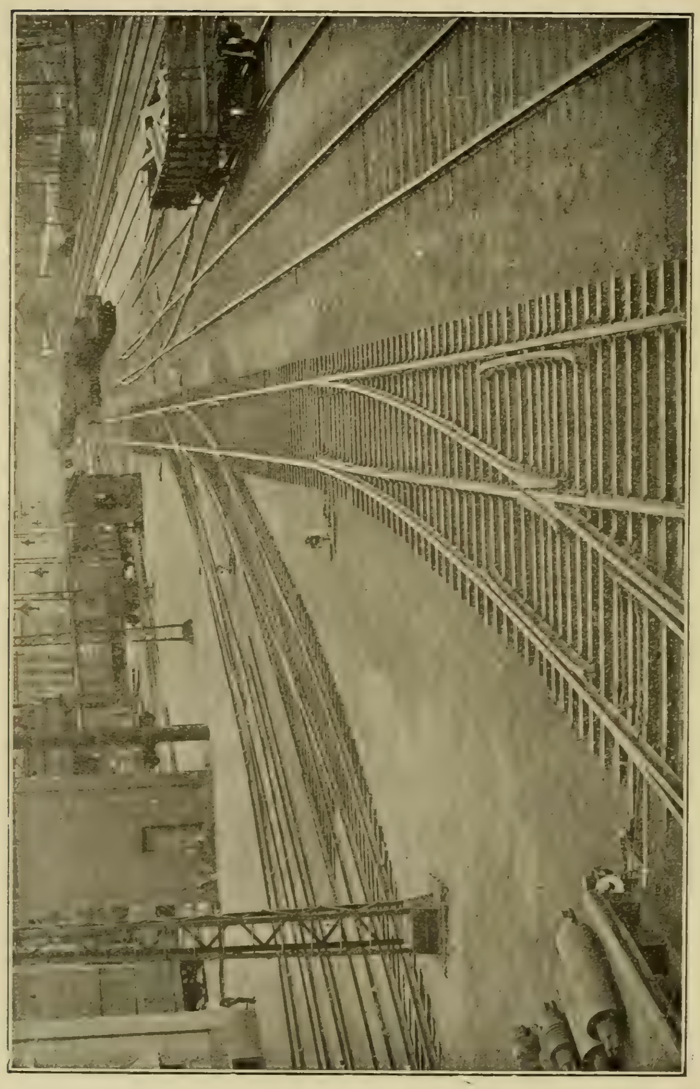


Pennsylvania Lines, Emsworth, Pa. Track insulated for Automatic Signals.



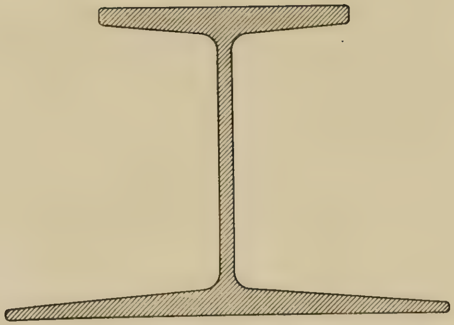
Method of Insulating Ties for Automatic Signals.

This consists of a fibre shim beneath the rail, fibre bushing encased between a malleable iron bushing and the rail clip. These are pressed together and remain as one piece.

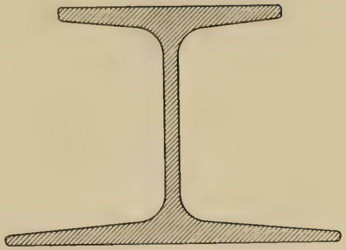


Steel Switch Ties, Homestead Steel Works.

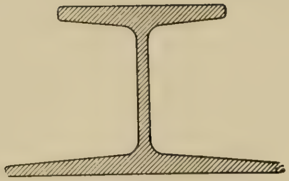
CROSS SECTION.



19 7-10 Pounds per Foot.



14½ Pounds per Foot.



9½ Pounds per Foot.

DIMENSIONS.

Weight per foot	19 7-10 pounds	14½ pounds	9½ pounds
Top flange, ...	4½″	4″	3″
Bottom flange,..	8″	6″	5″
Depth, ...	5½″	4¼″	3″

easy to detect this wear, and as the shims do not all go at once, they can easily be renewed from time to time. We have also done some insulating by the use of wooden blocks under the rails, but they did not last longer than a year or a year and a half. The track on the Pennsylvania Lines at Emsworth has been insulated in this manner, and it is necessary to make occasional renewals. The first year very little was done, but this year we notice there has been quite a number of renewals.

Another point which I want to bring out is, that a steel tie to be serviceable should be of such section that it can be used any place. A section which has special shaping to admit the rail or assist in holding it to gauge, is not suitable in switches as each tie would have to be prepared as a separate piece. The I beam tie is rolled in long lengths and can be cut to any length and applied any place in any track. In other words, in order to make the steel tie interesting, it has to be almost ready for the track when it goes from the rolls, the finishing part being the expensive end, and the less you have of this the cheaper the tie can be placed on the market.

Mr. Atwood spoke of wave motion in the ties. The tendency among the railroads is to increase the number of ties under the rail, and I think that by doing this the wave motion will be decreased, thereby decreasing the wear on the rails. Formerly railroads used 16 ties under a 33′ rail, but today some are using as many as 22.

MR. EDWIN F. WENDT: Mr. President—Mr. Porter's article is exactly what it claims to be,—a statement of the practicability and life of steel cross ties. The experience of the Bessemer & Lake Erie Railroad is valuable and the paper of the evening is a direct contribution to the literature of the subject. However, two additions should be made to the article:

First—The weight of the steel tie should be given in order that its cost could be computed.

Second—An illustration of the tie should be included in the Proceedings in order that the reader may readily understand the form and size of the steel tie which has been described.

And now just a word in regard to the McCune tie, an illustration of which appears on the blackboard. When the Proceedings are printed a detailed plan of the McCune tie should be included in order that the reader could readily grasp the essential details, including form of tie in cross-section and longitudinal elevation, size of steel members, weight, etc.

In considering the practicability of the use of steel cross ties, there should be some discussion of the tie question in general. In America about 80,000,000 cross ties are used every year, or an average of one cross tie for every individual in this country. The supply of timber for cross ties is very limited and unequal to the demand. This condition of the timber industry is what makes the question such an important one at this time.

While I believe that the best tie is a first class White Oak Tie, 7″ thick, 9″ face, 8′ 6″ long treated with some preservative, yet we all know that such ties are very scarce and the railroads are about facing the problem of purchasing ties of other material than wood. We need not stop at this time to state just why an oak tie is better than a steel tie. The reasons are many. The superiority of white oak ties is generally recognized by railway engineers in charge of maintenance of way, and the advocates of steel ties do not deny this superiority. The purchase of steel ties is being advocated because timber cannot be procured in sufficient quantities to supply the demand for cross ties. It is no longer possible in the United States to purchase 80,000,000 first class cross ties per year. The supply of durable timber is inadequate. There are two solutions of the present difficulty:

First—Railroads may continue the purchase of wooden ties of inferior timber when the same has been treated with a preservative which will insure a longer life for the tie when in the track. This policy is being followed quite generally throughout the western part of the United States with most excellent results. Treated ties, however, are not used in any quantities east of the Mississippi River. For a valuable discussion of the comparative value of cross ties of different materials the members of the Railway Club are referred to Bulletin 75 issued in May, 1906, by the American Railway Engineering and Maintenance of Way Association. The article was written by W. C. Cushing, Chief Engineer Maintenance of Way, Pennsylvania Lines, Southwest System.

Second—The other solution of the problem is the purchase of steel cross ties or concrete ties reinforced by steel, or composition cross ties. The man who is able to design a steel or composition cross tie which will successfully supplant the wooden tie has his fortune made. Many attempts have been made to design such a tie, but without complete success. Probably a thousand forms of steel ties have been designed and patented.

In the countries of Europe this is especially the case. England, Germany and France have experimented with steel ties for 25 or more years. During a European trip in 1903, while passing through the countries above mentioned, I examined the railway tracks for the purpose of informing myself regarding the design and use of steel ties. However, I was disappointed in not finding steel ties in the track. The best tracks in Europe are laid with wooden ties and the most popular tie is the treated wooden tie. The experience of these countries seems to teach that they have not yet found the proper form for an economical steel tie.

Whether steel or composition ties will be more generally purchased in the future no one can foretell. The proper policy to pursue at the present time is to experiment with the several forms of ties which seem to have most promising future.

The Pittsburg & Lake Erie Railroad is at the present time testing 25 Percival Reinforced Concrete Ties, furnished without cost by the manufacturer in Galveston, Texas. The same railroad is also testing 3,000 Carnegie steel ties of the same form and dimensions as those in use on the Bessemer Railroad.

The tie question in general is a very live one. The railroads are under the necessity of going long distances and paying large prices for timber ties. First class white oak ties at the present time, delivered at Pittsburg, are worth 80c each. The price has advanced every year during the past ten years.

We must begin to experiment with other materials without further delay. It matters not whether the wooden tie is the best tie, if such ties cannot be purchased.

Mr. Porter's article is very timely and contains information of value to the railway maintenance engineer, and we all hope that the steel tie may meet the peculiar conditions to which railway track is subjected. Timber is scarce, while steel is produced in great abundance; and if the proper form of steel tie is found, all difficulty in connection with the purchase of cross ties will have passed away.

PRESIDENT: I believe Mr. Stucki could tell us something about steel ties in foreign countries.

MR. A. STUCKI: Europe has used steel ties for many years in various forms. It used pressed steel as well as rolled sections. It also used longitudinal steel girders, located directly underneath the rails, to support the same; but notwithstanding all this, the tie mostly used yet by our friends across the Atlantic is a wooden tie, which is often treated by creosote or other chemicals to offset the destructive action of the water.

I must admit' that I am more acquainted with what goes on top of the rail than what goes under it. Nonetheless I have at different times designed metal ties, but all have so far proved too expensive, compared with the wooden tie. But I fully agree with Mr. Wendt that the time will come when we have to use a material other than wood; *when* will depend on the price of the timber, or, which is equivalent, on its scarcity.

Steel, pressed or rolled, has been used in so many designs that it would be impossible to determine which is the best design, and to simplify matters we may enumerate the essential features which an up-to-date tie should possess in order to win out in actual service. They are as follows:

First—The material must be distributed, so as to provide sufficient strength in both directions.

Second—The thickness of the material should be sufficient to insure a long life, notwithstanding possible corrosion.

Third—There should be sufficient bearing surface: a, between the rail and the tie; b, between tie and ballast vertically; c, between tie and ballast longitudinally; d, between tie and ballast laterally.

Fourth—The rail fastening should be simple and effective.

Fifth—The section and shape should be such so as not to hinder the tamping.

Sixth—For every dollar expended the service should be a maximum.

The last mentioned point, that of economy, will always be the ultimate consideration, and as long as wooden ties can be bought from 50 to 80 cents apiece, and as long as they can be treated for 20 cents apiece, insuring thereby an average life of not less than 10 years, it seems almost impossible for any metal to compete on this ground. Amongst other railroads the Santa Fe has treated large numbers of their ties. They use the "Wellhouse" process, which costs about 20 cents per tie, and they found that of those laid in '94 only 28 per cent were found replaced in 1904. This establishes the average life above mentioned, and by the way corresponds very closely with the experience in Europe. It is stated that there are about 15,000,000 of treated ties laid in the United States every year. There are also half a dozen or more different processes used in the treatment of the same. However, in most the cases the price per tie does not materially change from the 20 cents above mentioned.

In many respects a cast steel tie would have great advantages. In the first place, the bulk of the material could be placed where it is needed, i. e., under the rail, where the load comes, while the central portion could be made light. This not only would mean a saving in material, but it also would mean that the tie will grip the ballast laterally and keep the track in line. Secondly, it must be conceded that a steel casting would be an excellent material to withstand the vibrations and the blows of the service; and last, but not least, the corrosion would be very much less than on rolled material.

Concrete has also been used in various ways for this purpose, either reinforced or otherwise, and in addition to what has been said by Mr. Wendt, I may mention that the P., Ft. W. & C. R. R. Co. has made several tests at different times, without, however, obtaining very satisfactory results. The Lake Shore, I understood, had somewhat better results, but generally speaking, it seems that concrete is not the proper material to be exposed to constant vibrations and shocks; that the water absorbed, due to its porous nature, would damage the tie in freezing and that the rail fastening will be a difficult problem. Possibly Mr. Trimble is present and can give us more details in regard to these experiments with concrete ties.

PRESIDENT: The suggestion made by Mr. Wendt that we have some illustrations is a point well taken, and I would ask Mr. Wendt and Mr. Stuckl and any who have any special design of tie to furnish the Secretary with a blue print so that it may be embodied in the report of the proceedings.

MR. SAMUEL E. DUFF, of Riter-Conley Mfg. Co.: I have given some study to this question of steel ties. I find in the discussion here tonight no one has brought up the question of the theoretical design of the steel tie or track support to carry the loads on the track. We have had a discussion of the I beam type of tie and the box girder form, but I have not heard anyone show that the loads on the cross ties are a certain fixed quantity and that that tie must act as a beam and therefore have a certain cross section if made out of steel to carry that load. That fixes the weight of the tie. And I think if that matter is worked out mathematically it will be plain that the I beam form of tie is theoretically the correct tie to give the minimum of material for the necessary strength.

In the investigations I made of this subject I considered three ways of supporting the track, first by a continuous support under the rail; second by an intermittent support under the rail; and third by supporting the two rails at once by a cross support, which is the ordinary cross tie method. I assumed certain axle loads as moving along the track and, making a mathematical examination of them to find out what each method of support would require as the smallest quantity of material to transmit those loads on to the road bed, I found that the cheapest form of support is the intermittent support separated in all respects, that is similar to a round cast iron pot shaped support which was used for many years and I guess is used yet in Africa. But that system of track support failed because it was not sufficiently well connected to remain in line or remain in surface. The next most economical form of support is one parallel with the rail. That system has been used to a great extent in Europe and to a certain extent thrown out. The reason for that you will find on investigation was faulty design of the structure itself. It had not the necessary strength to carry the loads and act as a bridge under the rail. The third support in economy of material is the steel cross tie, and I think a mathematical investigation will show that the I beam form of cross tie is theoretically the correct economical shape for that purpose.

PRESIDENT: During the coming winter we hope to be able to have the subject of wooden ties, the possible supply and the manner of treating, presented by a representative of the government. It will be interesting to have both sides of it.

Inasmuch as the hour is late, we will ask Mr. Porter to reply to any of the points that have been raised that he cares to, and I feel that we are obliged to Mr. Porter for this very able paper.

MR. PORTER: I simply want to answer one question, and that is the question raised by Mr. Atwood, whether in winter time the wave motion in the rail might cause trouble, either by bringing severe strains on the rail or interfering with the fastenings. I have no theory to advance, but I can say that we have been laying steel ties right along through the winter, in all kinds of weather, and on all kinds of material, all kinds of filling, clay, sand, gravel and slag, and we have run our traffic over this new track, and we have not broken any rails, which indicates that it has not brought any undue strains on the rail. We have had no trouble with the fastenings. Wherever the material was such that the tie would settle, the material upon the ties or resting upon the base of the ties would generally crack off.

Now in the first stretch of 4.4 miles, which was laid continuously, we just kept an extra gang on there long enough to fill the track, when I took them away and have not sent them back since. The section gang, of course, goes over this track the same as they do over the other track. Mr. McCann, Section Foreman, estimated we have not had occasion in any way to disturb over one bolt in 250. The track walker goes along and taps the bolts to see if there is any indication of a loose joint in any way, and as near as we could keep track of it we have only had to touch one bolt in 250.

MR. D. J. REDDING: While we are not all experts, I am sure we all appreciate the value of the information that has been brought out here tonight in the paper and in the discussion that has taken place. And I move that a vote of thanks be extended to Mr. Porter and the other gentlemen who have taken part.

The motion, being duly seconded, was carried unanimously.

The Nominating Committee presented the following nominations for officers for the ensuing year, to be voted for by ballot in the usual way:

For President,	F. H. Stark D. J. Redding
1st Vice President,	Geo. T. Barnsley G. P. Sweeley
2d Vice President,	H. B. Ayers R. L. Kleine J. F. Prendergast
Executive Committee,	L. H. Turner F. R. McFeatters G. E. Carson Robert Blackall Thos. Kirke
Finance Committee,	Charles Lindstrom A. Stucki John T. Brown D. C. Noble R. Evans J. D. Harris
Membership Committee,	R. A. Bole A. M. Schoyer Stephen C. Mason H. W. Watts O. G. Ferguson E. W. Summers
Secretary,	J. D. Conway H. V. Porter
Treasurer,	J. D. McIlwain J. L. Hukill

Pittsburgh, Pa., Sept. 29, 1906.

Mr. J. D. Conway, Secretary,
Railway Club of Pittsburgh,
Gen'l Offices P. & L. E. R. R.,
South Side, City.

Dear Sir: I want to give you a few facts relative to steel ties in answer to Mr. Atwood's inquiries of last night. He was very much interested in the fact as to how they were to insulate steel ties in order to take care of their track signal system if steel ties should be adopted by their railroad. The gentleman is taking a good point.

I believe he is absolutely correct that their signal system would be interferred with to a very great extent. I do not believe there is any system in existênce, or do I think there can be any made, that will perfectly insulate steel ties; that is a number of steel ties laid in a road-bed of a track, but the matter of track signals is being worked out in a very much better manner by the electrical engineers. There is a system in use on some of the Western lines where they use a cable system instead of a track current. The cable carries the wires and they are connected with the track at convenient points between each block station, so that when the train passes over the contact point it opens or closses the circuit as the case may be, and by a convenient arrangement of signals and weights on same the signals drop from red to green and then to white, after a certain length of time. The track circuit system of electric signaling for train movement and train protection has always been a very poor one, and an extremely expensive one to maintain, on account of the number of points to be taken care of, and for a great many other reasons which are well known to Mr. Atwood, or any other engineer of a railroad connected with the M. of W. Department.

There is another matter that Mr. Atwood spoke of, that is the wave motion of rails connected to a rigid steel tie. This is another point very well taken. The trouble in Germany, France and Russia, where they have used "I" beam section solid ties for the last twenty years, has always been that there is positively no elasticity on a track built in this manner, and the creeping of the rails, or the wave motion as Mr. Atwood very properly calls it, will very soon shear the bolts and clamps or any other fastening that may be applied. That is one thing that we have looked out for in our box girder shaped steel plate tie. There is a certain amount of elasticity in this tie where it is not filled up with ballast (and the construction of it is such that it cannot be filled entirely at any time with ballast) so that this tie has just enough movement in itself to move with the rail, making it absolutely free from pressure against the clamps or bearing points of the rail seat.

Yours truly,

FRANK McCUNE,

General Superintendent,

Monongahela Connecting R. R. Co.

Upon Motion, adjourned.

SECRETARIES SOCIETY MEETING.

The Society of Railway Club Secretaries met in annual session at the Hotel Marlborough-Blenheim, Atlantic City, N. J., on Friday afternoon, June 15, 1906, with John D. Conway, of Pittsburgh, Pa., Chairman, presiding.

Roll call was responded to as follows:

New York Railroad Club—Daniel M. Brady, Harry D. Vought, Secretary.

Central Railway Club—Harry D. Vought, Secretary.

New England Railroad Club—E. L. Janes, Secretary.

Western Railroad Club—No representation.

Northwest Railroad Club—No representation.

St. Louis Railroad Club—C. W. Waughop, First Vice-President.

Southern and Southwestern Railroad Club—No representation.

Pacific Coast Railroad Club—No representation.

Canadian Railroad Club—James Powell, Secretary.

Railway Club of Pittsburgh—F. H. Stark, President; J. D. Conway, Secretary.

Richmond Railroad Club—F. O. Robinson, Secretary.

Iowa Railroad Club—E. M. Wentworth, President.

The minutes of the annual meeting of 1905 were read and approved.

The Secretary-Treasurer presented the following report, which, on motion of Mr. Powell, was received and accepted:

SECRETARY-TREASURER'S ANNUAL REPORT, 1906.

When the flight of time and the nearness of the date for our annual meeting made the preparation of an annual report by your Secretary-Treasurer imperative, it was undertaken with reluctance and hesitation, so far as a review of a year's work was concerned.

Ordinarily the recording officer of the general run of organizations, whose meetings are frequent or otherwise, has experiences, and a consideration of affairs of more or less variety. These are likely to furnish food for thought and reflection during the period in which he serves his constituency. At the close of his term they are susceptible of being woven into an interesting narrative; one of practical value in the lessons it teaches, the foundation it lays for improvement, the stimulus given for greater activity and achievement by those to whom it is particularly addressed, and the conclusion offered for mutual betterment and the guidance of those who succeed the author in the line of duty and responsibility he has followed.

In this regard, neither fact nor the figment of imagination appeared to be available, or offered inspiration calculated to serve the purpose of creating that which would fit the occasion. In retrospection little was found having a direct bearing upon the present or that forcefully indicated opportunity for intoxicating enthusiasm, delirious delight, spirit argument or critical comment. In short, the numerals of "23" appeared in proportions so startling as to prompt an eager desire to heed their significance and obey their autocratic command.

Under these conditions and circumstances the situation was not gratifying nor the prospect encouraging. You will, therefore, not be surprised at the state of mind in which the burden was taken up and appreciate the mental perplexities it involved.

There had been in the past twelve months a woeful dearth of incident and no work of moment beyond the preparation of records, their careful preservation, the compilation and publication of our appreciated Index of Club Subjects and the saving of our treasury from exhaustion.

All this may seem a multiplicity of words, and doubtless it is; but something had to be done in order that the writer might not be accused of relapsing into a state of desuetude and of failing to earn the munificent reward it has been customary to shower upon his office. Possibly, also, its tone may be deemed apologetic and not without reason; but it must not be so construed with respect to the need of our Society, its purpose or what it does, and has done. To have come here empty-handed today would have been an invitation for invidious comparison and adverse criticism. Whatever weakness is betrayed, whatever excuse is offered, and whatever opinion this conglomerated accumulation of profuse verbiage may provoke, the object in mind in the beginning may have been discovered, the hint sought to be conveyed may have been understood. In that event, this is no profitless diatrive.

Our membership is practically what it was because there has been no further increase in the number of kindred clubs—a fact that due consideration for the resources and revenue of those now in operation should perhaps prompt us to be thankful.

With very few exceptions, the financial obligation of our members have been promptly met. The only regrettable feature in the record is the seeming indifference of one, and the indisposition of a single club to continue its active co-operation with our Society. There is reason to believe, however, that this is due entirely to misconception and misunderstanding, and that a renewal of former relations can be induced.

It is a matter of further regret that we do not get such an attendance at our annual meetings as we ought to have, and which is essential to the attainment of all the objects for which we first organized, or of others that may be suggested from time to time.

There can be no such helpful interchange of thought and experience as originally contemplated unless a greater number of the Secretaries get together at a given time. The success and perpetuity of the Society is in some measure dependent upon this and it involves also the welfare of the individual clubs. Many men make many minds. These mental forces when brought into intimate association give assurances of results that will be illuminating and conducive to general good. The most successful Club is that which has a live Secretary, one that in addition to inherent efficiency, fidelity and intelligent appreciation of the many exactions of his position, is endowed with the faculty for initiation. In no better way will these qualifications be broadened and adaptability promoted than in the work and opportunities that this Society contemplates and offers. It is most important, therefore, that at least a majority of both active and associate members should meet in conference not less than once a year, and it would undoubtedly be wise if they did so every six months.

The question naturally arising in this connection is whether meeting only once, and that during the conventions of the Master Car Builders and American Railway Master Mechanics Associations is a mistake? It is commended to you as of serious import at this time, for whatever concerns our interests as a Society, is undeniably indirectly vital to the organizations we represent as well as our usefulness therein.

With apologies for trespassing at this length upon your time and patience, and trusting that it may be deemed worthy of some consideration, it is respectfully submitted with the usual financial statement appended.

FINANCIAL STATEMENT.

Balance on hand, June 16, 1905	$ 51 03
Receipts during year	110 00
Total	$161 03
Disbusements	$ 96 00
Balance on hand June 15, 1906	$ 65 03

Respectfully submitted,

HARRY D. VOUGHT.
Secretary-Treasurer.

Mr. Robinson suggested that the Proceedings of the meeting be printed in the next issue of the Index of Subjects.

After some discussion, it was agreed, on motion of Mr. Powell, that the Society recommend to the various Clubs, that the Proceedings of its annual meeting be published with the official Proceedings of the first fall meeting of each Club ,for the information of Club members.

In this connection Mr. Brady said he was in hearty sympathy with the idea of giving the work of the Society the widest possible publicity; that the Society should not hide its light under a bushel.

He favored sending to the leading technical publications a copy of the official record of the meeting, believing that it would be a step in the right direction, and that all Clubs would get a direct and quick return therefrom. Its work and objects would then be better and more generally understood, and the Secretary was instructed to send a record of the meeting to the papers in question.

Referring to the point raised in the report of the Secretary-Treasurer, relative to date selected for the meeting of the Society.

Mr. Robinson said he thought a mistake was made in naming June 15th.

Mr. Powell favored the fixing of a definite date between the conventions of the M. C. B. and M. M. Associations. He also believed that it would be well to meet twice a year.

Mr. Waughop doubted the wisdom of holding two meetings.

Mr. Jaynes referred to the fact that a semi-annual meeting had been tried without satisfactory results. It might be well for all the Secretaries, but he doubted that the attendance of Club officers could be obtained.

Mr. Vought moved to hold the next annual meeting at 10 a. m. on the Saturday succeeding the first of the two conventions.

Mr. Brady admitted that the holding of two meetings a year had not heretofore been attended with as gratifying results as was desired. He was inclined to favor another trial of the proposition, as the work done might have the effect of stimulating the Boards of Management of the various Clubs, and lead to the enlargement and widening to a maximum point of the field in which the various Clubs operate. It might also have the effect of concentrating attention upon the Society's work and efforts made for the benefit of individual Clubs, upon the part of their officers who are associate members of the Society, give more snap and stimulation to Club work, and lead associate members to take a more active interest in the affairs and objects of the Society.

Mr. Vought's motion prevailed, and, on motion of Mr. Waughop, it was agreed to also hold a meeting of the Society in New York on the second Saturday in December at 10 a. m., at such place as may hereafter be arranged.

Chairman Conway stated that, at his request, Mr. Powell had prepared a special paper for the meeting, and that he was prepared to present the same. Owing to lack of time, it was agreed that the paper should be read at the Society dinner in the evening.

It was as follows:

PAPER READ BY MR. JAMES POWELL.

At the last annual meeting of the Society, I happened to suggest a subject in connection with our meeting, which I thought would be of interest, and was most important in regard to the financial standing of all railway Clubs, i. e.: "How to Obtain and Retain Advertisers for the Club Proceedings."

Our worthy President, desirous of fulfilling the duties of his office, requested me to introduce this subject at this meeting, and in the brief space of time placed at my disposal, I will endeavor to put before you a few ideas which have occurred to me in connection with this subject.

As you are all aware, our Clubs cannot be supported on the amount of the members' subscriptions, as this barely pays for the printing of the Proceedings. The other expenses of printing, rent, salaries, entertainments, etc., make up a large sum, which, if charged in as a subscription, would very considerably reduce the membership, whilst the object of the Clubs is to encourage railway men to join in order to discuss and listen to subjects for their own and their employer's good. We, therefore, have to fall back on our friends, the advertisers, who in many cases recognize the good the Club is doing, and support it for the good of the cause. Others, again, contribute in order to keep their manufactures before the railway men, knowing that the Proceedings will reach certain quarters and catch the eyes of the leading railway men.

It is oftentimes very difficult to obtain advertisements from some firms, but I have found out that if a certain persistency is kept up in regard to this matter—allowing of course, that it is done in an agreeable manner—you will, in many cases, obtain a quarter, half or whole page advertisement, just the same as a supply man very seldom gains admission to the sanctum sanctorum of the superintendent on his first visit, but who very politely thanks the chief clerk, smiles, hands him a good cigar, and says he will call again.

It is just as well, when seeking advertisers, to forward a copy of the Proceedings to the prospective advertiser, giving him charges for space, and pointing out certain locations where his advertisement would show up best. If he has a competitor who advertises in your Proceedings, call his attention to this fact, as this very often brings forth a request for space. Whenever any entertainments take place, in connection with the Club, invite manufacturers, managers, sales agents, etc., to the meeting, as well as the regular meetings. This brings them in contact with your members, as well as introducing them to the railway men, with whom they do, or should do, business, as well as showing them the work the Club is doing. At our last annual banquet, owing to a mistake on the part of the printers, the whole of our advertisers received an invitation to attend the affair. The first intimation I received of this was a reply from one of our advertisers, from an impossible distance, stating how much he appreciated the courtesy but would be unable to accept, at the same time wish us every success. Others also replied, thanking us for the invitation and saying that they would be pleased to have their representative at the banquet. Finally, after the banquet, I came to the conclusion that it was not a mistake at all to invite the advertisers, as we received their appreciation and also obtained some new advertisers, and the expenses did not amount to anything, seeing that they were paying for it all.

Often the advertisers in the supply business will bring along a friend in the same business and introduce him to the Club and point out to him the advantages to be gained by joining and advertising. It is always well to be on the lookout for these and do your best to explain the objects and advantages of the Club, introducing them at the same time to the Executive Officers.

Another point is to take up the Proceedings of other Clubs and see what advertisers are not in your Proceedings, as a number of them, perhaps, do not know of your existence. Let them know that you are alive and wish to have their business. There are many firms paying thousands and thousands of dollars a year in advertising, and they know that it pays, and their business is principally supplying railway companies; and why should not they support the Clubs such as we represent, by distributing some of their advertising to our papers?

Also look up the engineering journals and see what firms are advertising and pick out those you think would be most suitable for your own Proceedings, sending them copies and prices for advertising. Often enough, I have received enquiries from totally unexpected quarters, which only goes to show that as Secretaries we ought always to be on the alert, as we have always a certain number who only stay with us for a while and then drop out, and we must seek others to take their place.

This annual meeting of the Secretaries at the Master Car Builders and American Railway Master Mechanics is, I consider, a good feature for the railway Clubs, as it brings us in contact with each other to exchange our ideas and permits us to know the supply men and manufacturers, who are exhibiting for the sake of showing their manufactures to the railway officials, with the object of obtaining their business. At such time they seem to be in their happiest and most entertaining moods, and it is then that you can do your best missionary work. By this means you are able to earn your salt and pay the expense that the Club is put to in paying your expenses to the meeting. Come to the convention armed with a list of your advertisers, and then you are prepared to know at once who are not on your books and to look out for their business.

I am not advocating a wholesale and indiscriminate canvas for advertisers, but a judicious and careful selection of those that are likely to be benefitted and will stay; otherwise you are going to give yourself and the Club a great deal of work in notifying printers and posting accounts in your books.

These are some of the ideas which have occurred to me in connection with obtaining advertisers. The next question is how to retain them? See that their advertisements are put in their proper places, and any alterations that they may wish be attended to promptly, apologizing if any mistakes occur on the part of the printers or yourself.

Render all accounts when they may become due, and acknowledge receipts at once when paid. Do not let the accounts run too long without asking for payment, as in some cases you will be carrying advertisements for which you will never receive anything.

I had several accounts passed over to me which had been long outstanding and which I thought were hopeless. However, I continued the advertisement and billed the firm regularly, and after some considerable time received the amount and continuance of the contract. In one particular instance, one firm had been allowed to run over three years without paying anything. I had billed them repeatedly, and almost given it up as hopeless.

However, I thought I would give them one more chance, and sent them another account, with the added indebtedness, but before the new account could reach them they forwarded a cheque for the previous amount. You may judge of my surprise when in about a week afterwards I received a cheque for the past and current account, which placed them away in advance. This, of course, was bad bookkeeping on their account, but was extremely pleasing to me.

Render duplicate contract forms and see that one is returned, otherwise you may have the advertisement repudiated.

Whenever an advertisement is asked to be discontinued, do not let it stop at that, but write the firm, stating that you would like to see their advertisement continued and usless there is some good and sufficient reason, you would much prefer to have it remain; and if there is any suggestion or improvement required, you will see it rectified. I have received quite a number of renewals in this manner.

Above all, impress on your advertisers that "It pays to advertise."

In introducing this subject, I hope it will be the means of provoking a discussion on the best methods of following this matter up, and I would suggest that a standard arrangement of rates with forms of contract be agreed upon.

With some Clubs the amount of money from advertising and other sources sometimes reaches into quite a considerable fund, and various projects are brought to utilize this to the best purpose. Some Clubs purchase books to form libraries for the use of members, others establish scholarships for the sons of its members, whilst others again endow a cot in a hospital for member's use. The last I consider a very laudable scheme, seeing that the majority of the members of the Clubs are railway men.

The Club to which I belong is only a young Club, but it is developing very rapidly, and, at the present time, we have under consideration a scheme for the use of any surplus monies. As no doubt before very long several of the Clubs will be in a position to seek some method of investment, I would suggest that this subject be made the topic of a paper for the next annual meeting of the Club Secretaries, and those Clubs who already have these schemes established could state their experiences and give their views on the working out of the different projects.

JAMES, POWELL,

Secretary Canadian Railway Club.

Election of officers being in order, on motion of Mr. Robinson, seconded by Mr. Jaynes, the officers for the past year were continued, as follows:

Chairman, John D. Conway, Pittsburgh, Pa.

Vice-Chairman, James Powell, Montreal, Quebec.

Secretary-Treasurer, Harry D. Vought, New York City.

On motion of Mr. Powell, the publication of the Index of Subjects was ordered continued, and the annual assessment upon the Clubs for the expenses of the Society fixed at $10.00 for the ensuing year.

An appropriation of $50 was authorized for the Society dinner in the evening, and $5 for expenses of Secretary for stenographer.

There being no further business, the Society adjourned.

The annual dinner was held at the Hotel Marlborough-Blenheim in the evening, in commemoration of the eleventh anniversary of the Society. It proved of much social enjoyment, exceeding the expectation of those by whom it was arranged, and established a spirit of good fellowship between the Society and Club officers, that, it is believed, will be conducive to substantial benefit for the Clubs, and, at the same time, add materially hereafter, to the attractiveness of the annual meeting, if it is repeated.

Among those who were privileged to participate on this occasion were:

George A. Post, O. C. Gayley, Daniel M. Brady, Richard T. Shea and George Keegan, New York City; W. B. Leach and E. L. Jaynes, Boston, Mass.; George W. West, Middletown, N. Y., Chairman of the Executive Committee of the New York Railroad Club; E. M. Wentworth, President of the Iowa Railroad Club; C. W. Waughop, First Vice-President of the St. Louis Railroad Club; F. O. Robinson, Richmond, Va.; L. H. Turner, ex-President, and F. H. Stark, President of the Railway Club of Pittsburgh; Eugene Chamberlin, Chairman, Freight Car Repair Pool, New York Central Lines, New York City; James Kilpatrick, Rock Island Lines, Chicago, Ill.; John D. Conway, Pittsburgh, Pa.; R. F. McKenna, Second Vice-President, Central Railway Club, Scranton, Pa., and Harry D. Vought, New York City.

EDWARD KERR, President. ESTABLISHED 1891 W. R. BROWN, Treas. and Supt.

LAWRENCEVILLE BRONZE CO.

BRASS and BRONZE FOUNDERS.

Brass and Bronze Castings of Every Description.

Engine Brasses and Car Journal Bearings a Specialty

Sole Manufacturers of CORINTHIAN BRONZE for Driving and Rod Brasses.

High Grade Babbitt Metals. Daily Capacity 50,000 Lbs.

Office and Works, Thirty-first Street and Penn Avenue.

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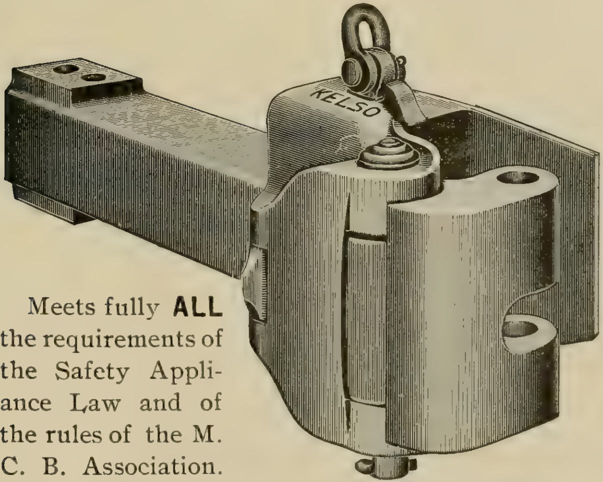

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CRANES
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STEAM
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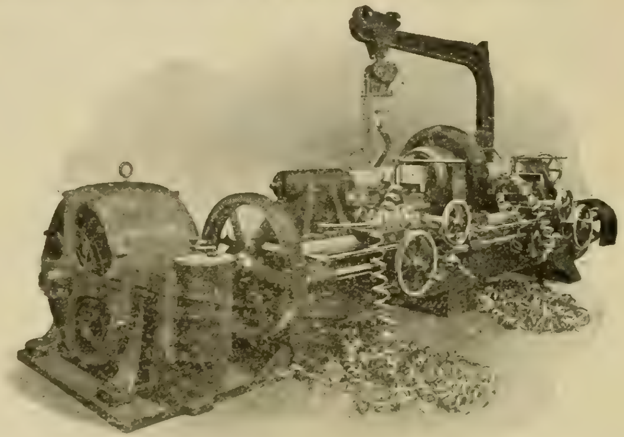

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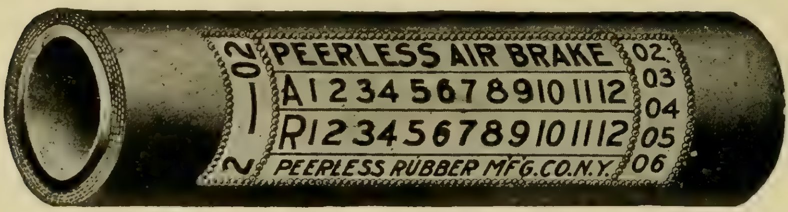
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RAILWAY SIGNAL LAMPS
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Guarantee cost per thousand miles for from one to five years when the conditions warrant it.

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Services of experts furnished free of charge to patrons interested in the economical use of oils.

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Made especially for use in headlights, Cab, Classification and Tail-lights, and for Switch and Semaphore Lamps. Burns equally well with the long time as with the one day burner, with or without chimney, as the burner requires. Is pure water white in color; high fire test; low cold test, and splendid gravity.

Please write to home office for further particulars.

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STRONG—CLEAN—TRUE

"—The ability to furnish you railroad-car and general MALLEABLE IRON CASTINGS of the finest quality is unsurpassed. Quick delivery too—when required.

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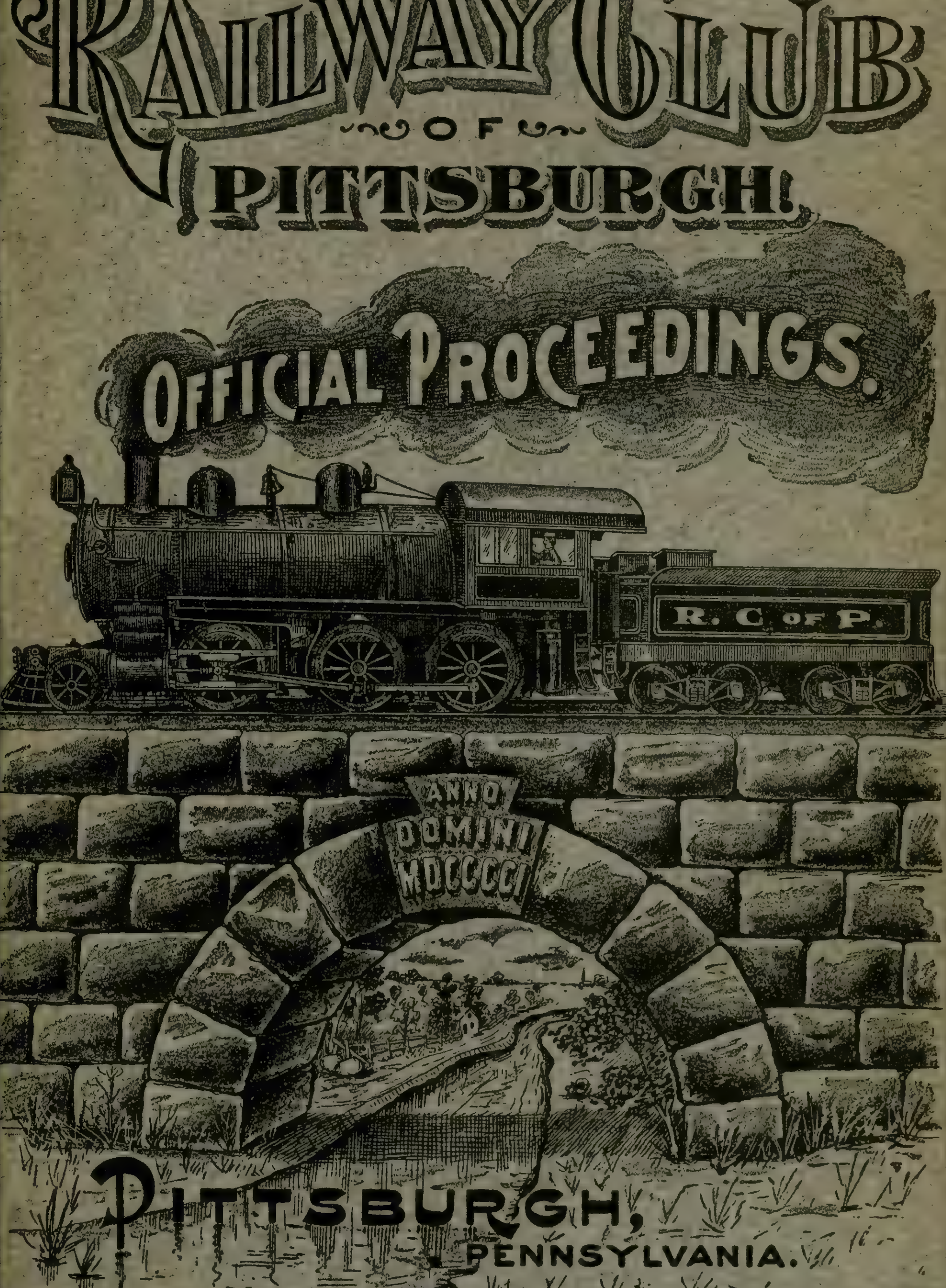

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Railway and Machinists' Tools and Supplies, Electric Traveling Cranes, Compressors, Pneumatic Hoists, Riveters, and complete Machine Shop and Foundry Equipment.

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The steel back brake shoe is an economy on all railway equipment.

LET US PROVE IT TO YOU.

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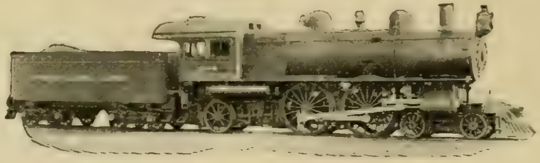

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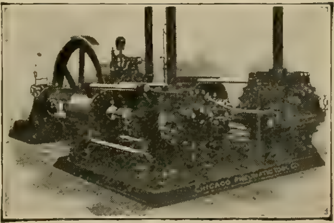

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"ONLY THE BEST IS THE CHEAPEST"

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MEETS ALL HIGH-GRADE REQUIREMENTS.

IT IS THE STANDARD METAL

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"THROUGH FRISCO'S FURNACE"

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Illustrations of seven modern steel frame buildings at San Francisco, that withstood the earthquakes and fire of April 18th, 1906, with reports on the rust-resisting qualities of Dixon's Silica-Graphite Paint on the steelwork.

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JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, U. S. A.

Tower & Climax Couplers

In Malleable Iron or Cast Steel.

Malleable Castings for Railroad Purposes.

The National Malleable Castings Co.

Cleveland, Chicago, Indianapolis, Toledo, Sharon.

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The Original
Which others have followed
The Standard
By which others are judged.

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The Westinghouse Air Brake Co.
PITTSBURG, PA.
The Air Brake Builders.

THE FRANKLIN MFG. CO.
C. J. S. MILLER, President,
MANUFACTURERS OF
AMBLER
ASBESTOS RING PACKING
FOR
THROTTLES AND AIR PUMPS,

Asbestos Railway Supplies
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Papers, Packings, Etc.

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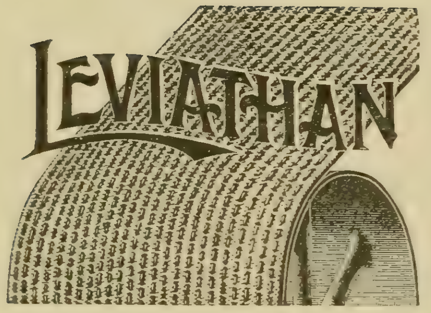

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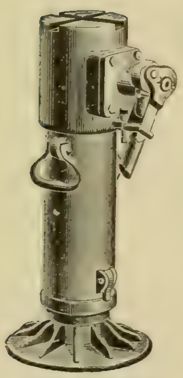
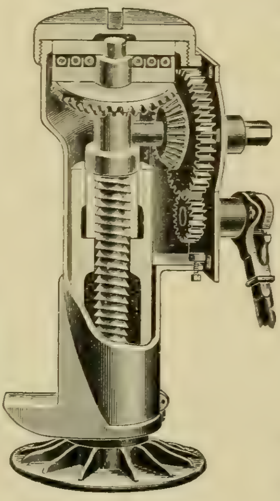
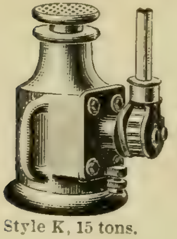
Samples sent to any Railroad Company on 30 days trial.



Style C. 35 Ton. 26 and 31 in. high.



Style B. J., 70 Tons, 26 in. high.



Style K, 15 tons.

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208 Third Ave., Pittsburg, Pa.

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OFFICIAL PROCEEDINGS

of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

OFFICERS, 1905 - 1906

President.

F. H. STARK, Supt. Rolling Stock, Pittsburgh Coal Co., Coraopolis, Pa.

First Vice-President.

D. J. REDDING, Master Mechanic, P. & L. E. R. R. Co., McKees Rocks, Pa.

Second Vice-President.

E. B. GILBERT, Supt. Motive Power, B. & L. E. R. R. Co., Greenville, Pa.

Secretary.

J. D. CONWAY, C. C. to S. M. P., P. & L. E. R. R. Co., Pittsburgh, Pa.

Treasurer.

J. D. McILWAIN, President, J. D. McIlwain & Co., Pittsburgh, Pa.

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STEPHEN C. MASON, Secretary, McConway & Torley Co., Pittsburgh, Pa.

J. B. SAFFORD, Superintendent, P. C. & Y. Ry. Co., Pittsburgh, Pa.

R. H. BLACKALL, Asst. to Genl. Mgr., Westinghouse Air Brake Co., Pittsburgh, Pa.

VOL. V.
No. 9.

Pittsburgh, Pa., Oct. 26, 1906.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

OCTOBER 26th, 1906.

The meeting was called to order at the Monongahela House, Pittsburgh, Pa., at eight o'clock P. M., with President F. H. Stark in the chair.

The following gentlemen registered:

MEMBERS.

Allen, James P.
Anderson, H. H.
Ault, C. B.
Barnsley, Geo. T.
Barwis, J. McC.
Bealor, B. G.
Blackall, R. H.
Bowery, Fred.
Booth, Arthur.
Brand, Thos.
Brown, A. D.
Brown, E. W.
Brown, Geo. P.
Burrell, J. E.
Campbell, I. K.
Carson, G. E.
Chittenden, A. D.
Conneely, E. K.
Conway, J. D.
Coudit, E. A.
Coulter, A. F.
Cover, N. C.
Cox, P. L.
Crawford. H. M.
Curtis. H. C.
Dambach, C. O.
Dawson, W. J., Jr.
Day, Edward B.
Decker, O. S.
Dyer, Jos.
Elder, Thos. W., Jr.
Foller, Chas. S.
Gearhart, H. J.
Gearhart, J. A.
Gies, Geo. E.
Gray, Robert.
Hackenburg, J. H.
Hall, C. W.
Hall, W. G.
Hempsted, J. G.
Henderson, J. W.
Hill, M. H.
Hobson, J. S.
Holbrook, D. O.
Hood, D. G.
Howe, D. M.
Hughes, J. E.
Hunter, H. S.
Huyett, E. G.
Jacob, W. W.
Jaggard, H. A.
Jennings, F. R.
Jenney, Jacob.
Kennedy, Jas.
Kessler, D. D.
Kinter, D. H.
Kissinger, C. F.
Knickerbocker, A. C.
Knight, E. A.
Koch. Felix.
Lace, Thos. C.
Lawson, Sherman S.
Lee, L. A.
Lobez, P. L.
Long, R. M.
Ludgate, B. A.
Mason, R. L.
Mason, Stephen C.
Michel, Wm. J.
Millar, C. W.
Miller, F. L.
Mitchell, A. G.
Morgan, Arthur.
Murphy, W. J.

McDonnell, F. V.
McFeatters, F. R.
McIlwain, J. D.
McKee, F. E.
McNulty, F. M.
Oates, Geo. M.
Obey, G. B.
Palmer, C. A.
Partington, James.
Patterson, S. H.
Peach, W. M.
Peacock, W. W.
Phelps, W. H., Jr.
Platt, A. T.
Porter, H. V.
Quest, W. O.
Randall, E. J.
Redding, D. J.
Reeve, F. J.
Rosenstock, J. H.
Ryan, Wm. F.
Sattley, E. C.
Shafer, W. L.
Shaler, F. J.
Shaw, O. M.
Shuck, Wm. C.
Smith, D. W.
Soles, G. H.
Spangler, C. P.
Stark, B. F.
Stark, F. H.
Stucki, A.
Suckfield, G. A.
Summers, E. W.
Swartz, H. E.
Sweeley, G. P.
Thomas, Chas.
Thomas, R. L.
Townsend, T. E.
Trinler, Chas. M.
Tucker, Jno. L.
Turner, L. H.
Van Kirk, T. F.
Walker, Geo. G.
Wallace, M. E.
Warne, J. C.
Warnock, H. R.
Weigel, F. S.
Wendt, Edwin F.
Wilkinson, Jas. A.
Wilson, Geo. A.
Wilson, W. J.
Winlo, R. C.
Wood, W. B.
Wood, W. H.
Yohe, J. B.
Zelch, J. L.

VISITORS.

Adams, R. J.
Alleman, Chas. W.
Bartlett, Chas. F.
Bigham, C. G.
Case, L. R.
Case, M. L.
Coey, David,
Coyle, W. L.
Leacock, Joe.
Lysinger, J. M.
Maguire, W. E.
Marshall, C. A.
Mingus, Geo. W.
McConnell, Jos.
McMurray, G. W.
Orrville, P. D.

Dermett, C. M.
Dolph, D. C.
Dunlevy, Jas. P.
Edwards, J. F.
Eichenberger, J. J.
Ecker, F. D.
Elliott, Geo. H.
Gauss, E. E.
Gies, Arthur A. W.
Gilg, Henry F.
Glass, Andrew.
Gurry, George.
Hamilton, F. M.
Johnson, Jno. F.
Jordan, R. H.
Lauderbaugh, Earl.
Pearce, Robert M.
Peck, C. D.
Phillips, C. J.
Porter, Chas. R.
Pratt, Louis W.
Rhodes, Jos. E.
Simmons, W. M.
Smith, Sion B.
Summers, J. M.
Thatcher, Ralph H.
Tomlinson, A. T.
Wardrop, J. W.
Watson, F. F.
Weimer, Hubbs.
Whitteker, A. C.
Wilson, Chas. T.
Yon, Chas.

The minutes of the last meeting being in the hands of the printer, the reading of them was dispensed with.

The Secretary read the following proposals for membership:

J. E. Brentzel, Dispatcher, Montour R. R. Co., Coraopolis, Pa.

Morris B. Brewster, Rep., Ewald Iron Co., St. Louis, Mo.

J. C. Bruff, R. R. Supply Salesman, Oil Well Supply Co., Pittsburgh, Pa.

G. E. Campbell, G. F. A., Union Railroad Co., Carnegie Bldg., Pittsburgh, Pa.

David Coey, Rep., Schoen Steel Wheel Co., P. O. Box 1212, Pittsburgh, Pa.

M. V. Copeland, Salesman, Standard Supply & Equipment Co., 811 Liberty St., Pittsburgh.

D. A. Callahan, A. G. Y. M., Penna. Lines West, Lock Box No. 1, Freedom, Pa.

J. E. Conner, Chief Clerk, Conway Yard, Penna. Lines West, 3rd Ave., Freedom, Pa.

H. M. Dobson, Manager, Wheeling Corrugating Co., 127 Fourth Ave., Pittsburgh, Pa.

Samuel E. Duff, Mgr. Allegheny Works, Riter-Conley Mfg. Co., No. 50 Washington Ave., Bellevue, Pa.

J. F. Edmonds, Manager, Garlock Packing Co., 204 Wood St., Pittsburgh, Pa.

G. H. Elliott, Buyer, Republic Iron & Steel Co., Pittsburgh, Pa.

H. T. Fairman, A. G. Y. M., Penna. Lines West, Hendrickson St., Conway, Pa.

C. M. Fraser, C. F. C. Clerk, Union Railroad Co., Carnegie Bldg., Pittsburgh, Pa.

E. E. Gauss, Rep., Robbins Electric Co., 830 Liberty St., Pittsburgh, Pa.

George Gurry, Supt. American Loco. Co., Allegheny, Pa.

C. D. Peck, Asst. Supt. American Loco. Co., Allegheny, Pa.

Fred. M. Hamilton, Pres. and Mgr., Am. Car Tracing and Shipping Co., Ferguson Bldg., Pittsburgh, Pa.

W. C. Hawes, Per Diem Clerk, B. & L. E. R. R. Co., Greenville, Pa.

Norman M. Hench, Engr. Track Appliances, Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

R. D. Hurley, Mgr., Independent Pneumatic Tool Co., Farmers Bank Bldg., Pittsburgh, Pa.

R. L. Jordan, Sales Agent, Republic Iron & Steel Co., 769 Frick Annex, Pittsburgh, Pa.

C. O. Keagy, Gen'l Car Inspector, Penna. R. R. Co., Altoona, Pa.

E. B. Leary, Pgh. Mgr., U. S. Metal & Mfg. Co., Arrott Bldg., Pittsburgh, Pa.

L. C. Lustenberger, Rep., Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

Harry M. MacSweeney, Engr., Trenton Shops, P. R. R. Co., Trenton, N. J.

C. A. Marshall, Pass. Condr., Montour R. R. Co., Imperial, Pa.

R. T. McMaster, Civil Engr., P. & L. E. R. R. Co., Coraopolis, Pa.

G. W. Mingus, Rep., Kalamazoo Ry. Supply Co., Diamond Bank Bldg., Pittsburgh, Pa.

W. E. Nagle, Rep., Edwin R. Kent & Co., Box 417, Wilmerding, Pa.

H. L. Newell, Storekeeper, B. & L. E. R. R. Co., Greenville, Pa.

C. J. Phillips, Trav. Aud., P. & L. E. R. R. Co., Gen'l. Office, Pittsburgh, Pa.

C. R. Phillips, Salesman, Shelby Steel Tube Co., Box 31, Cleveland, O.

W. J. Schlacks, Western Sales Agt., McCord & Co., Old Colony Bldg., Chicago, Ill.

Chas. E. Walsh, Clerk, Pur. Dept., Penna. Lines West, Room 725 Union Station, Pittsburgh, Pa.

Hubbs Weimer, Gen'l. Bookkeeper, P. & L. E. R. R. Co., General Office, Pittsburgh, Pa.

D. L. Wells, General Agent, Erie R. R. Co., Park Building, Pittsburgh, Pa.

C. W. Williams, Foreman, B. & O. R. R. Co., 4823 Leytle St., Pittsburgh, Pa.

PRESIDENT: After these names have been approved by the Executive Committee the gentlemen will become members.

The Secretary read the following communications:

THE UNION SWITCH & SIGNAL CO.,
Pittsburgh, Pa.

Swissvale, Pa., October 24th, 1906.

J. D. Conway, Esq.,
Secretary Railway Club of Pittsburgh,
Offices Pittsburgh & Lake Erie R. R., Pittsburgh, Pa.

Dear Sir:—I have just received word from New York which calls me there tonight on business too important to be neglected. It is quite possible that I may be able to do what is immediately necessary on Thursday and so get back to Pittsburg in time for your smoker, Friday night. Unfortunately, I cannot promise this. I think that you had better fill my place on your list of speakers, and if I get back in time I will take my chance of finding an opportunity to make my talk. I assure you that I should not go away now if it were not really important for the interests of my company.

Yours very truly,

H. G. PROUT.

New York, October 25th, 1906.

J. D. Conway, Esq.,
Offices, Pittsburgh & Lake Erie Railroad,
Pittsburgh, Penna.

Dear Sir:—The business which brought me to New York will keep me here for a day or two yet.

I regret this personally very much, because I had looked forward to the Club Smoker with a great deal of pleasure. I thought of it as an opportunity to renew some old acquaintances and make some new ones among a lot of men of whom I want to see more. But you will understand how a railroad man or a soldier must take up his pack and go when he is ordered, and I am in much the same position.

Yours very truly,

H. G. PROUT.

New York, N. Y., Oct. 24, 1906.

My Dear Mr. Conway:

"The spirit is willing, but the flesh is weak."

While I had promised myself the pleasure of being with you at the Pittsburgh Club meeting on Friday night, the 26th, I now find it impossible, as I leave early in the morning for Albany, where business will engage my attention just long enough, unfortunately, to prevent my reaching Pittsburg in time for the meeting.

I am just as disappointed as I can be, as I had hoped to be with you.

Remember me to all.

With sincere regards, yours,

E. CHAMBERLIN.

PRESIDENT: If there are no objections these communications will be placed on the minutes.

Next in order will be the report of the Nominating Committee.

MR. D. M. HOWE: Mr. President and Gentlemen:—After a very strenuous time last night, working until pretty nearly three o'clock this morning counting the very large vote, the Committee wishes to make the following report—and I will take the liberty of reading only the list of those elected.

PRESIDENT—F. H. Stark.
FIRST VICE PRESIDENT—Geo. T. Barnsley.
SECOND VICE PRESIDENT—H. B. Ayers.
EXECUTIVE COMMITTEE—L. H. Turner, F. R. McFeatters and Robert Blackall.
FINANCE COMMITTEE—Chas. Lindstrom, John T. Brown and D. C. Noble.
MEMBERSHIP COMMITTEE—R. A. Bole, A. M. Schoyer, S. C. Mason, H. W. Watts and E. W. Summers.
SECRETARY—John D. Conway.
TREASURER—J. D. McIlwain.

PRESIDENT: Gentlemen—There are many good things to follow, and I will not burden you with any extended remarks. I desire, however, to thank the members of this Club for the honor conferred upon me again. I feel that it is a credit to be associated with an organization of this character. From the beginning it has had a good, healthy, wholesome growth. We hold the unique position of having the manufacturer represented with the shipping interests, hence we labor together for one common end, to work out problems that are perhaps more difficult to master than in any other territory in this country. Our subjects have been of interest and profit. During the past year I believe the attendance has been equal to and perhaps a little greater than heretofore. The subjects have been of value, and the discussions have been such as to indicate the interest taken in our efforts. We also hold an enviable position as a social organization where good fellowship reigns. I believe there is a work to be done in the future equal to that of the past. We have problems that are to be brought out in the matter of transportation, in the question of car construction, in the maintenance of way. The Standing Committee on M. C. B. Rules for the year can feel proud of the work done by the Committee, for more recommendations that were presented by the Standing Committee of this organization were adopted at the last Master Car Builders' Convention than from any other Club, and I am not sure but that as many of our recommendations were adopted as of all the other Clubs put together. Therefore I believe that the field is still open and that with the co-operation of the membership and the officials, as has been in the past, we shall have another successful year. I thank you, gentlemen.

The reports of the Secretary and Treasurer were read by the Secretary, as follows:

SECRETARY'S REPORT.

To the Officers and Members of the Railway Club of Pittsburgh.

Gentlemen: Your Secretary is pleased to summarize briefly the events closing our fifth anniversary. The results of a successful year are manifested by a review of the summary which follows this introductory.

Our friends who presented subjects at the meetings could hardly receive a better testimonial than evidenced by the good attendance at the meetings, and the fact that their papers were given prominence by the technical magazines of the country. In fact, I may say, the welfare and success of a club such as ours depends very largely upon two strong factors: i. e., the author and the advertiser. No better testimonial can be tendered the latter than for the individual member to note what he has to sell, and all things being equal, show a little preference when placing his order. Co-operation in this way makes for the good of the Club and opens the way for all to contribute to its welfare.

We can with some pride again commend our Standing Committee on Revision of the M. C. B. Rules, as their suggestions were largely accepted by the association at its meeting held at Atlantic City, June last; in fact, the greater number of changes adopted were suggested by our committee.

It is to be regretted that we are compelled to show so many members suspended for nonpayment of dues, but those who have been dropped have been carried for three or four years, and this indifference makes it advisable to drop them from the list until they may see fit to meet the delinquency and ask for re-instatement.

Regardless, however, of the large number of deliquencies, it will be seen that we have a steady growth in membership, showing a net increase during the year of 107 members.

Death removed from our midst during the year the following members:

Edgar S. Low,
Nathaniel P. Hobart,
W. R. Brown.

I take this occasion to thank my friends for the many kindnesses shown me during the year.

The following is a summary of the membership, financial condition, etc., for the year up to and including this meeting:

MEMBERSHIP.

Reported last year	632	
Received into membership	187	819
Suspended, non-payment of dues	49	
Resigned	24	
Loss of address	4	
Removed by death	3	80
Present membership		739

FINANCIAL.

RECEIPTS—

In hands of Treasurer last year	$1,042.67	
From advertisers	1,065.00	
From dues	1,904.40	
From sale of Proceedings	3.00	$4,015.07

DISBURSEMENTS—

Printing Proceedings, advance sheets and notices	706.25	
Hotel, luncheon, etc	644.35	
Postage for Journals and correspondence	161.40	
Secretary's trip to Atlantic City	50.00	
Salary, Secretary, year 1904-1905	500.00	
Binding Proceedings	145.00	
Cigars for meetings	91.50	
Entertainment	214.10	
Stationery and supplies	36.00	
Messenger service	20.75	
Miscellaneous	22.82	2,657.16
Balance in hands of Treasurer		$1,357.91

J. D. CONWAY, Secretary.

Approved:

F. R. McFEATTERS,
J. F. PRENDERGAST,
G. E. CARSON,
Executive Committee.

TREASURER'S REPORT.

Pittsburgh, Pa., October 26th, 1906.

RECEIPTS—		
Balance on hand from last year	$1,042.67	
Received from Secretary during year	2,972.40	$4,015.07
EXPENDITURES—		
Paid out on Secretary's checks		$2,657.16
Balance on hand		$1,357.91

Respectfully submitted,
J. D. McILWAIN, Treasurer.

Approved:

F. R. McFEATTERS,
J. F. PRENDERGAST,
G. E. CARSON,
Executive Committee.

ON MOTION the reports are accepted.

PRESIDENT: We have had the misfortune to lose by death during the year Mr. W. R. Brown, and I will appoint as a Committee on Resolutions Messrs. Edward Kerr, L. H. Turner and R. H. Blackall.

It is our privilege to have with us tonight a man who does not need any introduction to this assemblage, whose presence is an inspiration to any one who has enjoyed his presence, a man whose life work is for the benefit of Western Pennsylvania, one who is broad enough to grant all people and all interests their rights. I am especially glad to know him as a man of high character, who devotes a great deal of his time for the upbuilding of not only his immediate neighbors, but those in adjoining boroughs. I will introduce to you Mr. J. W. Wardrop, who will be the first speaker of the evening:

Mr. J. W. WARDROP, Secretary M. & M. Association: Mr. Chairman and Gentlemen:—I think that the hardest position a man has to fill at any time is the position of a substitute. And when I heard the letters read expressing regret at inability to be here I thought of a little story that you have all heard, perhaps, and which gave rise to a wish in my own make up. It is said that a very talented speaker was to appear in the State of Maine during a political campaign. He was caught in one of those things that sometimes happen to a railroad after a storm, and telegraphed to Tom Reed, "Unable to appear. Get a substitute. Wash out on line." Reed telegraphed immediately, "Buy a shirt and come on."

When my friend, your secretary, asked me to be here I said, "Certainly." It is the first opportunity I have had to show my appreciation of the very kind invitation to appear before you over a year ago. As soon as I had given my consent, however, I sought another substitute. He is here, a prisoner at the bar, and must plead his own case. My good friend Mr. Pratt from Tacoma. I then tried to give the evening to Mr. Pratt, but your Secretary would not permit that and so I am before you, not to make an address, but to throw out a thought, because an audience to me is always an opportunity.

The thought I wish to express must be boiled down considerably, because I desire my friend and your guest to have most of the time. The thought is "The Organization of Man and of Men." Every man in the room has been bothered more or less in his career, whether it be commercial, manufacturing or in railway life, by what he must admit to be a disorganization of his own talent, and an inability, if you please, to see far enough into the future and to focalize or to organize that talent, and to concentrate or centralize upon the mark that he has fixed before his mind's eye. I have been tormented with that same thought myself.

There are many organizations in the world. Some are large in numbers. They seem to amount to something. But they are beating the air; they are making a noise; they endeavor to bring together and to focalize their talent, and yet they are absolutely without power and one day is like the day before, simply full of regret. There are other organizations that are made up of seemingly insignificant parts, weak in themselves, and yet, organized, they amount to something. Their presence is felt in any and every community, and whatever they put their hands to they accomplish. Now what is the difference between the two? Just two words that you all anticipate, unity and action. That is all.

They have brought a unity of thought and a unity of purpose and a unity of action to bear. They have, as it were, set up an ideal. Through this unity of thought and of purpose, and of action, they have had a vision, and every effort of their life, with that vision before them, has been directed toward it until they felt it to be material, and they have won. And so as we go through life we are prone to think of the organization of men and of capital much more than we think of the organization of ourselves, our own talent, our own mind, our own ideal, our own soul, our own imagination and our own ability. We are prone to think of these last of all.

When the Japanese nation threw the chip from the shoulder of China the world stood aghast and the nations of the earth said that China's millions would simply march upon them and brush them off the face of the earth. You know the result: "China humiliated to the dust." Then when the little nation, Japan, knocked the chip off the Russian soldier's shoulder it took our breath away and we stood aghast again. And the world said Russia will simply march down upon Japan and brush it and its people off the earth. But the little four-feet-and-a-half of what we are sometimes pleased to term the "yellow peril," organized in his thought, organized in his purpose, bringing these into action, seeing but one man, his Emperor, marched against the giants and the batteries and the strongholds of Russia and humiliated that nation in a way that has made a mark that must forever rest a blot upon the history of Russia.

Organization. It is not the size of the man, it is not the number of men, but it is the organization of the man and the organization of the men with but one thought and with only one regret, and that was that each had not a dozen lives to give instead of one.

We have also the organization of a child, if you please, the organization of its mind and of its faculties, of its sight and its speech, its hearing, its taste and its talent, organized and concentrated and unified and put into action until we have the man of large affairs, the great mind and the great character, making its mark among the millions of earth, not because of peculiar advantage but because of practical organization. The same thing is true of the musician who organizes his mind, his purpose, his imagination, who organizes his soul, and by the action of these is able to bring the world to its knees or send it out to war. We have the same organization and lesson in the painter who with his palette and brush is able to transfer his thought, his purpose, his imagination and his soul upon the canvas, before which the world will bow in admiration of all that is noble and good.

We have the same thing, if you please, among the nations. Away back in the history of a peculiar people we find them ill at ease. We find one of their own number bringing them out from under oppression because his own life had been organized. We find him on the plains perfecting what he had begun. We follow their forty years' march through the desert. We find a nation born, we find it unified, concentrated, with one thought, with one purpose, acting as one, until we have a nation such as the world must admire and wonder at. We have a nation without a capital, without a flag, without a head, without a country, a nation that is despised and rejected and persecuted by everybody; we have a nation that is hunted and cut down by the sword and shot down upon the streets; we have a nation that has nothing it can call its own, and yet a unified, organized nation. As one man said, "Where are they?" another answered, "Where ain't they?" A nation who can today by the tightening or loosening of its purse strings decide the peace and the war of the world. Organization!

We have the same organization, if you please, in our own country, and this country had to learn the lesson. We had first the colonies, we had then the early wars, then one nation one day and thirteen the next. We had a constitution introduced. We had a new Congress brought into existence. We had before this, if you please, the great unifying force in this country, the Revolution. There is where we learned our lesson. Prior to that we had jealousies, and we had debt. Under the new, we have a *United* States. We have a country that under this organization has gone through three epochs unparalleled in history. What Japan copied, America fought for; what Japan took on in twenty-five years America gave 100 years and shed its best blood to produce. We had three great epochs, the reconstruction of the States, the great Civil War and the development of the Nation. We learned the lesson, as I say, in the 1700's. Through this unifying of thought and of purpose and of action the debt decreased, jealousy between parts ceased, until we have one government, one flag, one country, one nation, respected wherever it is mentioned, and a great world power today. All from organization, an organization that makes for the peace of the world, an organization that leads in the commerce of the world, an organization that stands as a beacon light of hope and of liberty for the oppressed of every nation, a country that stands for the right against the wrong, a country meriting the respect and admiration of all nations, a country that by unity of thought, unity of purpose and unity of action has power to enforce right principles and put down wrong wherever it raises its head; a country that sheds a benign influence upon the governments of the world.

PRESIDENT: Gentlemen, we have with us one who comes from the Far West, who no doubt will entertain you and instruct you people in the East. It gives me pleasure to introduce to you Mr. L. W. Pratt, Secretary of the Chamber of Commerce of Tacoma, Washington.

MR. L. T. PRATT: Mr. President, Gentlemen:—I have been sitting here enwrapped in the eloquence that has fallen from the lips of one whom I shall henceforth consider a philosopher and a guide. I have known him until today as a genial, wholesouled, effective organizer and leader of men. But I have never before listened to him when he has been giving such words of wisdom as have fallen from his lips tonight. I was glad to participate in the applause which burst forth when he finished a period descriptive of our great country. But if I were to attempt to delve into philosophy and give you words of wisdom, I would be by comparison with my friend Wardrop as one who would bluff "with a pair of deuces against a royal flush."

But I am inclined to think that I might join in the spirit that our friend Wardrop wrought up in me, and quote the words of one who felt that this is a very large and a very grand country, and who bounded it as follows: "Bounded on the north by the Aurora Borealis, on the east by the rising sun, on the south by the procession of the equinoxes, and on the west by the crack of doom." Well I come from the outer edge, from the "crack of doom" end of our country. But I feel in coming to Pittsburg, and particularly in addressing this organization, as if I had come to the prime meridian of the transportation of the world. I remember how I felt the first time I went from London down to Greenwich. I timed that trip so as to get there at 12 o'clock, and I wanted to feel the sensation of being where time begins and ends, as it were, at the very center of the world, on the prime meridian of the universe, at 12 o'clock. I was there when the clock was striking twelve, but, gentlemen, that was a mere fancy. There isn't any special reason for putting the prime meridian at Greenwich, except that a great observatory is there and the Britishers are always slavish to precedent, and because they have had a good deal to do with the geography of the earth. But if you were to look for the real prime meridian, we would find that you railway men of Pittsburgh have located it where it belongs, when you measure the traffic of the lines, "*east and west of Pittsburgh.*" And so I feel tonight that it is a very great privilege to come from the Far West and to stand here at the prime meridian of the traffic of the United States, and to meet you gentlemen who are devoting yourselves to the transportation business. It is a privilege which, until last night when I received a note from Mr. Wardrop extending an invitation to me to come here tonight, I had not the remotest anticipation of having during my stay in Pittsburgh.

I suppose the privilege is accorded me here of saying something about the Far West, "not forgetting Tacoma." Gentlemen, you know that some years ago, before our country was as well known as it is today, there were some of our greatest statesmen who looked with contempt upon the Pacific Coast and the Far West, regarded it as a waste and desolation, a useless appendage of our country, something that we might just as well cast aside, something that was not worth paying a dollar for. But I can borrow a comparison from some one who is far more eloquent and far more imaginative than I, who expressed the thought that if the Pilgrim Fathers instead of landing on Plymouth Rock had set their feet upon the shores of Puget Sound, then New England today would be a barren wilderness. Well, now I am one of those people who take their hats off to the Pilgrim Fathers. I was brought up to so reverence the Pilgrim Fathers that instead of simply taking off my hat I have shaved my head ("The speaker uses a fine comb") out of respect for their glorious achievements and their blessed memory. But I cannot think of the time when those "foaming waves dashed high on a storm and rock bound coast," without agreeing with the man whom I have quoted, that it is a mighty lucky thing for New England that they landed on that self same coast. Yes, we may join in reverence for their deeds and we may perhaps attribute some of the sterling qualities of American character to the fact that those early pioneers had so little to work with, had such hardships to undergo and had to make, as it were, bricks without straw and build up an empire out of nothing. In the providence of the Almighty it was reserved for these latter days, and for you men engaged in transportation, to ring up the curtain on the last great act in the world drama—the development of the Pacific Coast of the United States.

I suppose it is proper for me to tell you a few of the things we have got out there. You probably have heard that we have climate and that we have scenery, and that such climate and such scenery as we have on the Pacific slope are not to be matched anywhere on the globe. And that is no dream. Eliminate, if you can, the extreme heat of summer and the severe cold of winter, conceive of a country where there are no thunder storms and no blizzards, where men can work without any abatement of their strength 365 days in the year, without anything in the climate to impair or weaken their energies, and you have a land that is ideal so far as climatic conditions are concerned. And then if there ever was a place where God Almighty piled up the snow capped mountains and clothed the hills with verdure from one year's end to the other, where He caused roses to grow in the greatest profusion, and where He placed everything that can delight the eyes and gratify the senses of men, He created that country round about the region of Puget Sound. General Sherman said when he got to Puget Sound that he had found God's country. A few years ago when Governor Savage of Nebraska went out to witness the laying of the keel of the battle ship named after his commonwealth, he made the remark that while he had heard from his earliest childhood of our first parents in paradise, never until he entered Point Defiance Park at Tacoma had he set his feet in the Garden of Eden. And he said he intended to go back to Nebraska, finish his term as Governor, and then come to Tacoma and spend the rest of his life. And I said to myself that he was the best jollier I ever heard. I wondered if he had told the same thing to the people in Seattle and would say something like it down in Portland. But let me tell you, Governor Savage meant what he said, and the following January a former Nebraskan, a resident of Tacoma, came into my office and handed me a letter from Governor Savage saying, "When I was in Tacoma last year I formed the purpose of spending the rest of my life there as soon as I could be released from the duties of the governorship of Nebraska. I have turned over the ship of state to my successor and I am arranging my business affairs and am shortly to start for Tacoma"—where he lives today, one of the best Tacoma boosters in the town.

Now climate and scenery are certainly attractive, and, by the way, I might mention, speaking of scenery, that just a few miles back of Tacoma the United States government has established a National Park. It may be that some of you gentlemen do not know that we have a national park, whose wonderful attractions will be as famous some day as the Yellowstone Park, or the Yosemite Valley, or the Grand Canyon of the Colorado, or Niagara Falls, and then you transportation men will be coining dollars out of the American sightseer's passion to see Mount Tacoma.

But we have something more than climate and scenery out there. I should like to make the assertion as modestly as possible that the four great classes of natural products which form the basis for 99½ per cent of all the industry and all the commerce of the United States are right at command there at the city of Tacoma and in that region about Puget Sound. For we have the products of agriculture, the products of the mines, the products of the forests and the products of fisheries. I remember a remark that was made by Mr. E. W. Parker of the United States Geological Survey, a remark that I have quoted once in Pittsburgh, but I think it is worth quoting again, to the effect that the four states in the Union that lead in their respective zones or belts in the production of coal, lead also in industrial activities. These four states are Pennsylvania, Illinois, Colorado and Washington. Now if there is any one thing that has made Pittsburgh what it is, and that has located the prime meridian of transportation at this city it is the possession of coal and coke. But nearer to Tacoma than Connellsville is to Pittsburgh are hundreds of millions of tons of coking coal, and there are hundreds of coke ovens producing it. We are utilizing it in reducing ores of copper and lead at Tacoma, and we are shipping that coke by vessels to the smelters up and down the coast where they are using it for the same purpose. And stored in the hills in and about Puget Sound and along the coast within easy reach by water transportation are immeasurable, almost inconceivable supplies, not only of copper and lead and gold and silver, but also of iron and tin. You now send to the Straits Settlements for tin, but the time will come when tin will be produced in our own domain in Alaska, and turned into the merchantable produce at the Smelters on Puget Sound, and this Alaska tin will form the basis for another great American industry. And with our iron and our coal and our coke and our limestone, we shall develop in the course of time a steel industry to meet the requirements of distant markets too far away from Pittsburgh to be served with the greatest economy from this point, for we have the natural products, the raw materials and the facilities for their manufacture in and about Tacoma.

And we not only have these wonderful mineral resources but we have agricultural lands there that produce wonderful crops of wheat, rye, and barley, and oats, and flax, and vegetables and fruits; almost everything in the way of agricultural products that enter into our commerce, with the exception of cotton and tobacco and sugar cane. Almost every other of our great staples are produced in enormous yields per acre out of the rich and productive fields of the "Inland Empire" across the Cascade Mountains, and we are now shipping from the city of Tacoma millions of bushels of wheat and barley annually to foreign markets. We have at Tacoma a single wheat warehouse which is 2350 feet long, nearly a half a mile, which enjoys the distinction of being the longest wheat warehouse in the world. Along the water side of that warehouse six or eight ocean vessels can load at the same time while trains of cars are lined up on the other side.

Speaking about agriculture, I should like to trespass on your time long enough to tell you something about the profits of agriculture in our section. This is a story I have rather hesitated to tell because I do not want you to think I am exaggerating. As a matter of fact, it is difficult for anyone who attempts to describe that country to come up to the full truth. Ten years ago, in 1896, it seemed that every man who followed the plow in the United States was on the verge of bankruptcy, if he had not already fallen in. Farm mortgages were being foreclosed, and almost everybody in the United States who was trying to make a living out of farming was poverty stricken. There was a farmer out there who had bought a lot of land—he had probably bought more than he ought to, but no more than he thought he ought to have, no more than he wanted to cultivate, and no more than he expected to reap great profits from. But with the price of wheat down to starvation level, he concluded to give up the job. He could not pay the interest on his mortgage, he could not pay the taxes on his land, and he went out to the barn and hung himself. Well, now somebody opened the barn door and found him gurgling there, and cut him down while he protested against being saved. He was very sorry to be resuscitated. He did not want to live, life had no atttractions for him. However, they kept a watch on him and it happened that just about that time, as some of you may remember, the price of wheat began to go up a little, along about in August, '96. Well, now let us pass over eight years until 1904, about two years ago this month I was talking with Mr. Alexander Baillie, the manager of a large wheat exporting firm at Tacoma, and I was asking him about a newspaper account of a check that was paid to an Eastern Washington farmer for over $46,000 for his wheat crop. I said:

"Is that not a pretty big check? How does that compare with some of your transactions."

"Well," he said, "of course that is a pretty big check. We don't pay many as big as that, but that is not a record. There is a man down at the Donnelly Hotel who lives out in the wheat country. I saw him yesterday and tried to buy his wheat. I offered him 75c a bushel, and he could keep all he needed to carry over for seed, and still let me have 100,000 bushels. But he would not take $75,000 because he said that his wheat was all paid for and he did not want the money, and he thought he could speculate on his wheat just as well as I could."

Well, I made some further inquiries about that man, and learned that he had 30,000 or 40,000 acres of land to raise sheep on, and a few thousands of sheep besides his thousands of acres of wheat land and his 100,000 bushels of wheat, and he did not owe a dollar on any of it, and he had so much money in bank that he did not care to sell any of his property until he could get the best price of the season. And that was only eight years after that same man had gone out to the barn and hung himself because of his poverty.

Now, gentlemen, that sounds like a romance, and it is. It is a romance of agriculture and it is a romance of finance, and it is a romance showing how some of our Western farmers are getting rich. But we have not only the mines and agriculture, but I want to say that the timber that clothes these hills of Western Washington is the grandest and greatest growth of timber that stands on this planet. We have forests of spruce and fir and cedar and hemlock that stand 200, 300 feet high. Logs—I have got a small section of a Tacoma toothpick down at the Exposition, and it is only a small one, because I could not get a big one into a car. It is seven feet in diameter. I wanted to bring on here a section of a stump something like 14 feet in diameter. That would have been possible if you had the transportation facilities to handle it. But the trouble is, you are not handling curiosities, you simply want to handle our merchantable lumber, and we are turning it out at the city of Tacoma at the rate of five hundred to six hundred million feet a year, and we are producing in the State of Washington three billion feet a year of lumber for the requirements of commerce, both in this country and abroad.

Five or six years ago, according to the United States census, Washington was fifth in the production of lumber. It was led then by Michigan, Wisconsin, Minnesota and Pennsylvania. But according to the figures that have been computed officially at Washington this year the State of Washington has jumped from the fifth to the first place, and not only that, but the State of Louisiana, which is now second, did not produce two-thirds as much lumber last year as the State of Washington. In other words, the State of Washington was first in lumber products and led the second by half of the second state's production.

This lumber industry is a great industry, and you might think we are wasting our resources, that this wealth of timber must be very rapidly disappearing if we are cutting three billion feet a year. Gentlemen, we have not yet cut in any single year one per cent of the stand, and each year's growth of our standing timber is probably more than we have yet cut in any one year. The difficulty, the problem before us now is to cut the merchantable, mature, ripe timber soon enough to have it serve the purposes of the human race before the trees fall, before they rot and decay, and to allow in place of the giant trees which we cut down other timber to grow on those slopes of the western hills. The growth of our timber is aided by the moisture from the Pacific Ocean, by a favorable climate that makes a tree grow more months in the year than a tree can grow in any other part of this country, and makes it possible to raise crops of merchantable timber and supply the markets of the world indefinitely. And we are in direct touch, by water as well as by rail, with the lumber consuming countries of the earth. We are shipping out of the port of Tacoma every year about 250 cargoes of wheat and lumber, that go to domestic and foreign ports, aside from the cargoes that are taken by our steamship lines running to Liverpool and Hamburg and French ports and Alaska and the Orient and South America and New York and San Francisco.

We are getting to be something of a traffic meridian ourselves. We are a good many degrees west of Pittsburgh, but we intend to be the next industrial and traffic meridian on the map. There is still another source of wealth I might mention, and that is the fish with which the waters of the Pacific are teeming. And, gentlemen, when you come to the fish course and call for chicken halibut, it is more than likely that you are getting halibut out of the Pacific that was landed at Tacoma and shipped across the continent for your delectation.

We have at Tacoma the largest fisheries plant in the United States, and it may surprise you some, but it is nevertheless true, that we are shipping hundreds of refrigerator cars packed with fresh fish to points in the East as far as Gloucester, Mass., and if that is not "sending coals to New Castle" what is there in this country to compare with it? Gloucester is the distributing point for fish on the Atlantic coast, and is receiving every week in the year fish from Tacoma. And besides, we are shipping millions of pounds of fish by express to the cities of the Middle West.

And while I am speaking of shipping by express and in carload lots I might just as well add that from the Puyallup Valley, just out of Tacoma, we are shipping fresh berries in carload lots not only to Butte and Helena, but to St. Paul and Minneapolis, and Chicago, and Kansas City, and St. Louis and other cities of the Middle West. And through the berry season we are shipping the berries that command the highest prices in those markets.

Now, gentlemen, that leads me to say one thing, and that is, that the interests that are represented in this room tonight have made possible these things. The interests that are represented here, the transportation interests of the United States, are doing more to develop our country than any other factors under the sun. I came from Tacoma to spend a few weeks in Pittsburgh. I didn't come with an ox team; I didn't start on the first of last January; I didn't have to bring tons of exhibits overland on sleds or on prairie schooners. The railroads brought a few tons of them here in nine days, and I started three or four days later and arrived here the same day as the carload of Tacoma exhibits arrived. Just stop and think of it, gentlemen. We haven't got to go back so very far when it was the work of a year to go out there and it took another year to come back. You transportation men have changed time; you have changed life; you have changed opportunities; you have changed results; you have made it possible for us to go not only from one end of this continent to another in an incredibly short space of time, but you have made it possible for all mankind to enjoy the rich treasures that the Almighty has stored up in that part of the country. And so the descendents of the Pilgrim Fathers are not so badly off after all, because they can send to Tacoma for their fish, and we can send them, if necessary, coal, and copper, and lead, and gold, and silver, and agricultural products that the barren old hills of New England could never raise, and if they ever run short of marble in Vermont we will furnish them marble for their tombstones.

That is all due to you people. I am glad of the chance to talk to a gathering of railroad men. I want you to "keep your eye on Tacoma." Every railroad man in the country is invited to focus his optics on Tacoma. Why? Because Tacoma has absolutely the best harbor on the Pacific coast and one of the very best harbors in the world today, and it is practically the only harbor on the Pacific coast that has got twelve square miles of level land adjacent to it, where you can put the railroad terminals of Chicago down alongside of what is equivalent to the wharf frontage of New York. Mr. Harriman, Mr. James J. Hill and the owners and controllers of several other railroads that have not already gotten into Tacoma are spending millions to get a good fair slice of that level land right next to the harbor of Tacoma. Mr. Harriman has spent six million dollars acquiring property at Tacoma this year for the Union and Southern Pacific, and the Chicago, Milwaukee & St. Paul is building from Tacoma east and from Evert, S. D., west, and the two extensions of this road will link hands at no distant day. Instead of one transcontinental line which has served the manufacturers and business men of Tacoma there will soon be from four to a half dozen gathering in the traffic that originates at this point. Where the traffic is, there the railroads are sure to go. That is why they come to Pittsburgh, and that is why they will all come to Tacoma some day, for we originate traffic and besides we hold a strategic position on the route to the great market of the future in the Orient.

Gentlemen, I do not know how much you have looked into the possibilities of trade with the Orient, but the Orient is going to be in the future a better market for the United States than Europe is today. Then the Pacific Ocean will be the greater of the world's greatest commercial activities. And any of you who have studied the situation on the Pacific Coast and have looked at the wonderful growth of commerce with the Orient and who appreciate that it is still only in its infancy, can see that what I am saying is no wild dream. Now the time is coming when our Pacific Coast, like your east coast, will have its great commercial ports and its great industrial centers. That time is not far off. But in the meantime we of the Pacific Coast look to you who are older, we look to Pittsburgh; we look to you with respect and admiration because of what you have accomplished, because of the position you have achieved and hold in the commercial world. Pittsburgh, the great manufacturing center of the world to-day, is Tacoma's prototype, and we hope to follow your leadership and make Tacoma the Pittsburgh of the Pacific Coast. I thank you.

MR. H. A. JAGGARD: Before we all take the first train for Tacoma I want to say just a word. I was in Gloucester in the course of the last summer and there was an ancient and fish-like smell about Gloucester which entirely confirms the idea that some of the fish from Tacoma got there. The fact is, this thing is set forth in a proverb which goes something like this: "You remember that Manchester is down there somewhere close to the sea, so that the natives speak of Manchester by the sea and Gloucester by the smell."

One other thought comes to me, and that is, that Mr. Pratt's remarks tonight recall the Bible. You will remember that it is there set forth that the meek shall inherit the earth, and it would therefore follow that the people who live in Tacoma are meek.

Now I want to move a vote of thanks to Mr. Wardrop and Mr. Pratt for the very unusually fine addresses.

The motion being duly seconded was carried by unanimous vote.

PRESIDENT: To Mr. Pratt I feel that we should remove our hats. My family would object to my shaving my head, but I feel that my hair is turning gray out of reverence for his country. He has so eloquently described the climate out there that the very atmosphere is so invigorating that one would feel as though he wanted to work all the time. I fear if Pittsburgh was duplicated out there we would have to all join the union to keep from working 24 hours in the day.

There are a few products apparently that they do not raise in Washington. We have in our own great State of Pennsylvania one product that brings comfort to many thousand souls, and I believe that Mr. Pratt is entitled to a gift from that product as a sort of memento or souvenir from Pennsylvania. Mr. Wardrop belongs with us and has the price, and under the circumstances he will have to purchase one for himself. (Mr. Pratt was here presented with a fine cigar about eighteen inches in length and the thickness of his arm.)

MR. PRATT: That is fine. That shall certainly be hung up in the Chamber of Commerce in Tacoma as a continuous reminder.

MR. GEO. E. GIES: Was any action taken on the report of the Nominating Committee? If not, I would move that the report be accepted and the Committee discharged with thanks.

The motion being duly seconded was carried.

ON MOTION the meeting adjourned for the discussion of a light lunch and an extended and interesting program of entertainment in the nature of a smoker. It will be understood that this smoker was pulled off before the Chamber of Commerce had taken final action on the smoke nuisance, anyhow all the modern appliances in the nature of smoke consumers were brought into use as the wives at home could verify from the odor of our clothing.

Programme was as follows:

1—Piano Selections......................Mr. Frank Haynes
2—The Imperial Quartette..................Vocal Selections
3—James P. Dunlevy.............Character Song and Story

Intermission ten minutes—Irrigate and "Smoke up."

4—Francis J. Straub...................In Mysterious Magic
5—Hugh F. Blaney..............Who Sings to Beat the Band

Intermission ten minutes—"Dampen," gentlemen, and light up.

6—Metzmaier Bros...................Roman Ring Acrobats
7—Julius Cohn..........................Singing Comedian

Intermission ten minutes—Eat, drink and Jollolify.

8—Jackson and Hawn.....................Comedy Acrobats
9—The Imperial Quatrtette...................In "Singings"

"All's Well That Ends Well."

W. R. BROWN.

We regret to announce that on October 9th occurred the death, from typhoid fever, of one of our members, Mr. W. R. Brown. Mr. Brown was only 45 years of age at the time of his death, but had reached the important position of Treasurer and Superintendent of the Lawrenceville Bronze Company of Pittsburgh, with which company he had been identified for the past twelve years. He gave his life services to the development and production of bronze. He was a man very highly esteemed among his friends and acquaintances.

Edward Kerr,
Robert H. Blackall,
L. H. Turner,
Committee.

RAILWAY CLUB OF PITTSBURGH CONSTITUTION.

ARTICLE I.

The name of this organization shall be "The Railway Club of Pittsburgh."

ARTICLE II.

OBJECTS.

The objects of this Club shall be mutual intercourse for the acquirement of knowledge, by reports and discussion, for the improvement of railway operation, construction, maintenance and equipment, and to bring into closer relationship men employed in railway work and kindred interests.

ARTICLE III.

MEMBERSHIP.

Section 1. The membership of this Club shall consist of persons interested in any department of railway service or kindred interests, or persons recommended by the Executive Committee upon the payment of the annual dues for the current year.

Sec. 2. Persons may become honorary members of this Club by a unanimous vote of all members present at any of its regular meetings, and shall be entitled to all the privileges of membership and not be subject to the payment of dues or assessments.

ARTICLE IV.

OFFICERS.

The officers of this Club shall consist of a President, First Vice President, Second Vice President, Secretary, Treasurer, Finance Committee consisting of three members, Membership Committee consisting of five members, and three Elective Executive Members who shall serve a term of one year from the date of their election unless a vacancy occurs, in which case a successor shall be elected to fill the unexpired term.

ARTICLE V.

DUTIES OF OFFICERS.

Sec. 1. The President will preside at all regular or special meetings of the Club and perform all duties pertaining to a presiding officer; also serve as a member of the Executive Committee.

Sec. 2. The First Vice President, in the absence of the President, will perform all the duties of that officer; the Second Vice President, in the absence of the President and First Vice President, will perform the duties of the presiding officer. The First and Second Vice Presidents shall also serve as members of the Executive Committee.

Sec. 3. The Secretary will attend all meetings of the Club or Executive Committee, keep full minutes of their proceedings, preserve the records and documents of the Club, accept and turn over all moneys received to the Treasurer at least once a month, draw cheques for all bills presented when approved by a majority of the Executive Committee present at any meetings of the Club, or Executive Committee meeting. He shall have charge of the publication of the Club proceedings and perform other routine work pertaining to the business affairs of the Club under the direction of the Executive Committee.

Sec. 4. The Treasurer shall receipt for all moneys received from the Secretary and deposit the same in the name of the Club within thirty days in a bank approved by the Executive Committee. All disbursements of the funds of the Club shall be by cheque signed by the Secretary and Treasurer.

Sec. 5. The Executive Committeee will exercise a general supervision over the affairs of the Club and authorize all expenditures of its funds. The elective members of this Committee shall also perform the duties of an auditing committee to audit the accounts of the Club at the close of a term or at any time necessary to do so.

Sec. 6. The Finance Committee will have general supervision over the finances of the Club, and perform such duties as may be assigned them by the President or First and Second Vice Presidents.

Sec. 7. The Membership Committee will perform such duties as may be assigned them by the President or First and Second Vice Presidents, and such other duites as may be proper for such a committee.

ARTICLE VI.

ELECTION OF OFFICERS.

Sec. 1. The officers shall be elected at the regular annual meeting as follows, except as otherwise provided for:

Sec. 2. Written forms will be mailed to all the members of the Club, not less than twenty days previous to the annual meeting, by the three elective members of the Executive Committee. These forms shall provide a method, so that each member may express his choice for the several offices to be filled.

Sec. 3. The three elective members of the Executive Committee will present to the President the names of the members receiving the highest number of votes for each office, together with the number of votes received.

Sec. 4. The President will announce the result of the ballot and declare the election.

Sec. 5. Should two or more members receive the same number of votes, it shall be decided by a vote of the members present, by ballot.

ARTICLE VII.

AMENDMENTS.

Amendments may be made to this Constitution by written request of ten members, presented at a regular meeting and decided by a two-thirds vote of the members present at the next regular meeting.

BY-LAWS.

ARTICLE I.

MEETINGS.

Section 1. The regular meetings of the Club shall be held at Pittsburgh, Pa., on the fourth Friday of each month, except June, July and August, at 8:00 o'clock P. M.

Sec. 2. The annual meeting shall be held on the fourth Friday of October each year.

Sec. 3. The President may, at such times as he deems expedient, or upon request of a quorum, call special meetings.

ARTICLE II.

QUORUM.

At any regular or special meeting nine members shall constitute a quorum.

ARTICLE III.

DUES.

Sec. 1. The dues of members shall be $2.00 per annum, $1.00 of same to apply to subscription for Club Journal, payable in advance, on or before the fourth Friday of September each year.

Sec. 2. Each member will be assessed $1.00 extra annually to provide light refreshments for each meeting.

Sec. 3. At the annual meeting members whose dues are unpaid shall be dropped from the roll after due notice mailed them at least thirty days previous.

Sec. 4. Members suspended for non-payment of dues shall not be reinstated until all arrearages have been paid.

Article IV.

ORDER OF BUSINESS.

1—Roll call.
2—Reading of the minutes.
3—Announcements of new members.
4—Reports of Committees.
5—Communications, notices, etc.
6—Unfinished business.
7—New business.
8—Recess.
9—Discussion of subjects presented at previous meeting.
10—Appointments of committees.
11—Election of officers.
12—Announcements.
13—Financial reports or statements.
14—Adjournment.

Article V.

SUBJECTS—PUBLICATIONS.

Sec. 1. The Executive Committee will provide the papers or matter for discussion at each regular meeting.

Sec. 2. The proceedings or such portion as the Executive Committee may approve shall be published (standard size, 6x9 inches), and mailed to the members of the Club or other similar clubs with which exchange is made.

Article VI.

The stenographic report of the meetings will be confined to resolutions, motions and discussions of papers unless otherwise directed by the presiding officer.

Article VII.

AMENDMENTS.

These By-Laws may be amended by written request of ten members, presented at a regular meeting, and a two-thirds vote of the members present at the next meeting.

MEMBERS.

Aikins, Jos. K.,
Chief Clerk to Supt.,
Pennsylvania R. R. Co.,
30th and Sarah sts., S. S.,
Pittsburgh, Pa.

Alexander, J. R.,
Gen'l R. F. of E.,
Pennsylvania R. R. Co.,
Altoona, Pa.

Allen, Harry L.,
Superintendent,
American Steel Foundries,
Alliance, Ohio.

Allen, Harvey A.,
care Pressed Steel Car Co.,
Fisher Bldg.,
Chicago, Ill.

Allen, Jas. P.,
Sales Agent,
Union Steel Castings Co.,
61st St. and A. V. Ry.,
Pittsburgh, Pa.

Anderson, H. H.,
General Superintendent,
Schoen Steel Wheel Co.,
P. O. Box 1212,
Pittsburgh, Pa.

Anderson, H. T.,
Chief Draftsman,
Standard Steel Car Co.,
Frick Building,
Pittsburgh, Pa.

Armbrust, C. W.,
President Manufacturers
Ry. Supply Co.,
Fisher Building,
Chicago, Ill.

Atterbury, W. W.,
General Manager,
Pennsylvania R. R. Co.,
Philadelphia, Pa.

Atwood, J. A.,
Chief Engineer,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Atwell, J. L.,
Mgr., Philip-Carey Mfg. Co.,
333 Second Ave.,
Pittsburgh, Pa.

Ault, Chas. B.,
Sales Manager,
Homestead Valve Mfg. Co.,
Homestead, Pa.

Ayers, H. B.,
General Superintendent,
American Locomotive Co.,
Imperial Bank Bldg.,
Montreal, Canada.

Bagnell, R. A.,
Mgr. R. R. Dept.,
Invisable Roll Screen Co.,
446 Adelphi St.,
Brooklyn, N. Y.

Bailey, Chas. D.,
Resident Manager,
Frank S. De Ronde Co.,
Ferguson Bldg.,
Pittsburgh, Pa.

Baker, Edwin H.,
Rep., Galena Signal Oil Co.,
26 Broadway,
New York, N. Y.

Baker, Jas. H.,
Manager, Solid Steel
Tool & Forge Co.,
1240 Palo Alto St.,
Pittsburgh, Pa.

Baldwin, Hasell W.,
V. P., T. H. Symington Co.,
Corning, N. Y.

Baldwin, Stephen Y.,
Com. Frt. Agent,
D. & H. Co., Bessemer Bldg.,
Pittsburgh, Pa.

Ball, Geo. L.,
Ball Chemical Co.,
907 West Diamond St.,
Allegheny, Pa.

Barney, H. E.,
Rep. Manning-Maxwell
& Moore,
Park Building,
Pittsburgh, Pa.

Barnsley, Geo. T.,
County Road Engineer,
Pittsburgh, Pa.

Barron, John,
V. P., Versailles Ry. Signal Co.,
Columbia Bank Bldg.,
Pittsburgh, Pa.

Bartley, Milton,
President, American Nut &
Bolt Fastener Co.,
Frick Building,
Pittsburgh, Pa.

Barwis, J. Mc.,
Fore. Insp'r., P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

Basford, G. M.,
care American Loco. Co.,
111 Broadway,
New York, N. Y.

Bealor, B. G.,
Mgr., Winfield R. R. Co.,
421 Wood St.,
Pittsburgh, Pa.

Beatty, E. G.,
Rep., Galena Signal Oil Co.,
Franklin, Pa.

Bell, T. H.,
M. M., N. Y. & C.
Gas Coal Co.,
Turtle Creek, Pa.

Bell, W. K.,
Inspector, P. R. R. Co.,
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Bellows, A. B.,
Manager, Pittsburgh
Testing Laboratory,
325 Water St.,
Pittsburgh, Pa.

Belsterling, C. S.,
Traffic Manager,
American Bridge Co.,
Frick Building,
Pittsburgh, Pa.

Bennett, H. R.,
Material Inspector,
P. R. R. Co.,
1013 Penn Ave.,
Pittsburgh, Pa.

Bigelow, Harry T.,
Rep., Hale & Kilburn Mfg. Co.,
Fisher Building,
Chicago, Ill.

Bihler, L. C.,
Traffic Manager,
Carnegie Steel Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Billingham, Jos.,
Rep., Vacuum Oil Co., Ltd.,
Norfolk Street, Strand,
London, W. C.

Bjerregard, Emanuel,
Rep., The Pocket List of
R. R. Officials,
24 Park Place,
New York, N. Y.

Blackall, Robt. H.,
Asst. to Genl. Manager,
Westinghouse Airbrake Co.,
Pittsburgh, Pa.

Blackford, F. G.,
Manager, Paint Dept.,
Bindley Hardware Co.,
Pittsburgh, Pa.

Blair, A. C.,
Vice President,
Youngstown Car Mfg. Co.,
Frick Building,
Pittsburgh, Pa.

Blattner, Jos.,
Cor. Allegheny Ave. and
Rebecca St.,
Allegheny, Pa.

Blest, M. C.,
Chief Draftsman,
Pressed Steel Car Co.,
84 Sheridan Ave.,
Bellevue, Pa.

Bole, Robt. A.,
Manager, Manning, Maxwell
& Moore,
Park Building,
Pittsburgh, Pa.

Bollinger, Conrad, Jr.,
Mgr. Ingersoll-Rand Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Bonsall, J. S.,
Manager, American Engineer and Railroad Journal,
1204 South 51st St.,
West Philadelphia, Pa.

Booth, Arthur,
Asst. to Pur. Agent,
Philadelphia Co.,
435 Sixth Ave.,
Pittsburgh, Pa.

Booth, J. K.,
Genl. Fore., B. & L. E. R. R.,
Greenville, Pa.

Booth, Jas.,
Rep., Midvale Steel Co.,
Frick Building,
Pittsburgh, Pa.

Bostwick, W. A.,
Metallurgical Engineer,
Carnegie Steel Co.,
Pittsburgh, Pa.

Bowery, Fred,
Vice Pres., American Nut & Bolt Fastener Co.,
306 Frick Building,
Pittsburgh, Pa.

Boyd, Henry W.,
Chief Clerk, National Car Wheel Company,
Pittsburgh, Pa.

Brady, Daniel M.,
President, Brady Brass Co.,
95 Liberty Street,
New York, N. Y.

Brainerd, E. C.,
Sales Agent, Nicola Bros. Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Brand, Thos.,
Train Master,
Montour R. R. Co.,
Coraopolis, Pa.

Branson, Craig R.,
Special Apprentice,
Pennsylvania Co.,
305 E. Jefferson St.,
Fort Wayne, Ind.

Brayton, Chas. A.,
President,
Standard Car Wheel Co.,
Cleveland, Ohio.

Brentzel, J. E.,
Dispatcher,
Montour R. R. Co.,
Coraopolis, Pa.

Brewster, Morris B.,
Rep., Ewald Iron Co.,
St. Louis, Mo.

Brittain, J. B.,
Asst. to Comp.,
Pennsylvania Lines,
Union Station,
Pittsburgh, Pa.

Brooks, J. B.,
Supt. Const., Westinghouse Air Brake Co.,
Wilkinsburg, Pa.

Brown, A. D.,
C. C. to Genl. Manager,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Brown, E. W.,
Inspector, P. R. Co.,
216 Union Depot,
Pittsburgh, Pa.

Brown, H. B.,
Master Mechanic,
Erie R. R. Co.,
Cleveland, Ohio.

Brown, F. Herbert,
President, Brown & Zortman Machinery Co.,
cor. Water and Wood sts.,
Pittsburgh, Pa.

Brown, Geo. P.,
Shop Clerk, Penn'a Co.,
1119 Franklin St.,
Allegheny, Pa.

Brown, Henry M.,
Manager,
Brown Car Wheel Works,
Buffalo, N. Y.

Brown, J. Alexander,
Manager, Pocket List of
R. R. Officials,
24 Park Place,
New York, N. Y.

Brown, John T.,
Vice Pres. and Genl. Manager,
Damascus Bronze Co.,
Allegheny, Pa.

Brown, John T., Jr.,
Supt. Duquesne Reduction Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Brown, Raymond B.,
Manager,
Duquesne Reduction Co.,
5432 Baywood St.,
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Bruff, J. C.,
R. R. Supply Agent,
Oil Well Supply Co.,
Pittsburgh, Pa

Buchanan, E. G.,
Rep., Carbon Steel Co.,
26 Cortlandt St.,
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Buchanan, W. J.,
M. C. B.,
B. & L. E. R. R. Co.,
Greenville, Pa.

Buckley, J. T.,
Rep., Jenkins Bros.,
Park Building,
Pittsburgh, Pa.

Bumbaugh, W. W.,
Pres., Monessen Foundry &
Machine Company,
Monessen, Pa.

Burrell, J. E.,
Chief Clerk to Genl. Agent,
P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

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Callahan, D. A.,
Asst. G. Y. M.,
Penna. Lines West,
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Calvert, J. E.,
Chemist, P. & L. E. R. R. Co.,
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Etna, Pa.

Campbell, A.,
Standard Steel Car Co.,
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Chicago, Ill.

Campbell, G. E.,
G. F. A., Union R. R. Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Campbell, I. K.,
care County Commissioners' Office,
Pittsburgh, Pa.

Campbell, W. A.,
Sec. and Treas.,
Vulcan Crucible Steel Co.,
Aliquippa, Pa.

Cantrell, C. W.,
Sales Agent, Herman H.
Hettler Lumber Co.,
First Nat'l Bank Bldg.,
Pittsburgh, Pa.

Cardwell, J. R.,
Pres., Cardwell Mfg. Co.,
Monadnock Block,
Chicago, Ill.

Carney, J. J.,
Foreman Erecting Shop,
B. & O. R. R.,
Glenwood Shops,
Pittsburgh, Pa.

Carson, G. E.,
Genl. Foreman, Car Dept.,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

Cassidy, D. E.,
M. M., West Penn Div.,
P. R. R. Company,
Allegheny, Pa.

Caton, E. L.,
Rep. Edwin W. Mudge & Co.,
Frick Building,
Pittsburgh, Pa.

Caton, W. J.,
Sales Agent,
American Lumber Co.,
Ninth Street,
Pittsburgh, Pa.

Caughey, E. G.,
Asst. Dist. Manager,
American Car & Fdy. Co.,
1133 Third Ave.,
Huntington, W. Va.

Chamberlain, E.,
Chairman F. C. R. Pool,
N. Y. C. Lines,
Grand Central Station,
New York, N. Y.

Chislett, Wm. B.,
Pass. Condr., P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

Chittenden, A. D.,
C. C. to Genl. Manager,
B. & L. E. R. R.,
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Clancy, J. R.,
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Coates, H. T., Jr.,
Asst. M. M.,
Penna R. R. Co.,
Harrisburg, Pa.

Coen, P. A.,
Care Pittsburgh Coal Co.,
Coraopolis, Pa.

Coey, David,
Rep., Schoen Steel Wheel Co.,
P. O. Box 1212,
Pittsburgh, Pa.

Coffin, J. S.,
Manager,
Galena Signal Oil Co.,
Franklin, Pa.

Coffin, W. E.,
Rep. National Malleable
Castings Co.,
Care "The Stratford,"
Cleveland, O.

Collier, Paul M.,
C. C. to Asst. to V. P.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Collins, William,
Car Fore., Mon. Con. R. R. Co.,
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Comstock, E. D.,
Genl. Pass. Agent,
B. & L. E. R. R. Co.,
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Pittsburgh, Pa.

Conneeley, E. K.,
Chief Clerk to Pur. Agt.,
P. & L. E. R. R. Co.,
Gen'l Office,
Pittsburgh, Pa.

Conner, J. E.,
Chief Clerk, Conway Yard,
Penn'a Lines West,
3rd Avenue,
Freedom, Pa.

Connolly, W. E.,
Superintendent,
Pennsylvania Car Wheel Co.,
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Conway, J. D.,
Chief Clerk to S. M. P.,
P. & L. E. R. R. Co.,
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Pittsburgh, Pa.

Cooper, Geo. A.,
Sales Agent,
Frost Ry. Supply Co.,
Penobscot Bldg.,
Detroit, Mich.

Copeland, M. V.,
Salesman, Standard
Supply & Equipment Co.,
811 Liberty St.,
Pittsburgh, Pa.

Cosgrove, H.,
F. C. Dept., P. R. R. Co.,
Pitcairn, Pa.

Cottrell, W.,
Foreman Car Repairs,
Erie R. R. Co.,
Wilson Ave.,
Cleveland, O.

Coudit, E. A., Jr.,
Rep., The Rail Joint Co.,
Lewis Block,
Pittsburgh, Pa.

Coulter, A. F.,
G. C. F., B. & O. R. R. Co.,
226 Elizabeth St.,
Pittsburgh, Pa.

Courson, Chas. L.,
Asst. Fore. Car Inspectors,
P. R. R. Company,
Pitcairn, Pa.

Coursin, J. F.,
General Foreman,
Pennsylvania R. R. Co.,
Pitcairn, Pa.

Courtney, D. C.,
Supt. of Motive Power,
Coal & Coke Ry.,
Elkins, W. Va.

Courtney, W. J.,
Manager Peerless Rubber
Manufacturing Company,
16 Warren St.,
New York, N. Y.

Cover, N. C.,
Clerk to Gen. Foreman,
P. & L. E. R. R. Co.,
Haselton, O.

Cox, P. L.,
Road Master,
Monon. Con. R. R.,
2nd Ave. near Bates St.,
Pittsburgh, Pa

Crawford, D. F.,
Genl. Supt. Motive Power,
Pennsylvania Lines West,
Pittsburgh, Pa.

Crawford, Harry M.,
Transitman,
Monon. R. R. Co.,
Brownsville, Pa.

Cromwell, S. A.,
G. F. C. D.,
B. & O. R. R. Co.,
Painesville, O.

Crouch, A. W.,
Engineering Dept., Dearborn
Drug & Chemical Co.,
House Building,
Pittsburgh, Pa.

Crute, W. R.,
Asst. Engr. of Tests,
Norfolk & Western Ry. Co.,
Roanoke, Va.

Cullen, Jas. K.,
President,
Niles Tool Works,
Hamilton, Ohio.

Cunningham, J. D.,
Sales Agent,
National Car Wheel Co.,
Allegheny, Pa.

Cunningham, W. F. ,
F. C. A., P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Currie, J. C.,
Rep., Nathan Mfg. Co.,
92 Liberty St.,
New York, N. Y.

Curtis, H. C.,
Clerk,
P., C., C. & St. L. R. R.,
Carnegie, Pa.

Dallam, C. B.,
President,
Pittsburgh Oil Refining Co.,
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Dambach, C. O.,
C. C. to Genl. Supt.,
W. & L. E. R. R. Co.,
Wabash Bldg.,
Pittsburgh, Pa.

Darby, H. F., Jr.,
Dist. Manager,
Cutter Electric & Mfg. Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Darby, R. F.,
Draftsman,
L. S. & M. S. Ry. Co.,
Cleveland, O.

Dashiell, J. W.,
F. & T. Agent, B. & O. R. R.,
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Daugherty, J. B.,
R. F. of E.,
B. & O. R. R .Co.,
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New Castle, Pa.

Davidson, W. H.,
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B. & O. R. R. Co.,
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Davis, G. H.,
Foreman Car Department,
Wabash-Pittsburgh
Terminal Ry. Co.,
Box 970, Carnegie, Pa.

Davis, M. J.,
Asst. M. M., P. R. R. Co.,
413 Tenth St.,
Altoona, Pa.

Davis, Thos. R.,
Rep., Flannery Bolt Co.,
Dravosburg, Pa.

Dawson, W. J., Jr.,
Freight Agent,
B. & O. R. R. Co.,
West Homestead, Pa.

Day, Edward B.,
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Railway & Engineering
Review,
1310 Machesney Bldg.,
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DeArmond, W. C.,
President, Protectus Co.,
North American Building,
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Decker, O. S.,
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Sligo Iron & Steel Co.,
Pittsburgh, Pa.

DeGress, Francis B., M. E.,
Manager,
Crocker Wheeler Co.,
39-41 Cortlandt St.,
New York, N. Y.

Demarest, T. W.,
Supt. Motive Power,
Pennsylvania Lines,
Ft. Wayne, Ind.

DeRemer, W. L.,
Rep., Spencer Otis Co.,
1707 Railway Exchange Bldg.,
Chicago, Ill.

DeVilbiss, G. J.,
M. M., B. & O. R. R. Co.,
Newark, Ohio.

Diamond, P. R.,
Magnus Metal Co.,
Buffalo, N. Y.

Dix, John W.,
Salesman, Carnegie Steel Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Dobson, H. M.,
Manager, Wheeling
Corrugating Co.,
127 Fourth Ave.,
Pittsburgh, Pa.

Donahue, C. J.,
Chief Clerk to Genl. Manager,
L. S. & M. S. Ry. Co.,
Cleveland, Ohio.

Donohoe, C. H.,
Genl. Yard Master,
P. & L. E. R. R. Co.,
Belle Vernon, Pa.

Dow, Geo. N.,
Genl. Mechanical Inspector,
L. S. & M. S. Ry. Co.,
Cleveland, Ohio.

Dowdell, Augustus,
Rep., Valentine & Co.,
57 Broadway,
New York, N. Y.

Drayer, U. S.,
Draftsman, P. R. R. Co.,
Altoona, Pa.

Duer, B. W.,
Supt., B. & O. R. R. Co.,
B. & O. Station,
Pittsburgh, Pa.

Duff, Samuel E.,
Mgr., Riter-Conley Mfg. Co.,
50 Washington Ave.,
Bellevue, Pa.

Dukesmith, F. H.,
Pres., Dukesmith Air
Brake Company,
Diamond Square,
Meadville, Pa.

Dunham, F. C.,
Special Sales Agent,
U. S. Metal & Mfg. Co.,
25 Broad St.,
New York, N. Y.

Duntley, W. O.,
Vice President, Chicago
Pneumatic Tool Co.,
Fisher Building,
Chicago, Ill.

Dyer, Jos.,
Chief Joint Inspector,
P. & L. E. and
Erie R. R. Cos.,
Youngstown, Ohio.

Edmonds, J. F.,
Mgr., Garlock Pack. Co.,
204 Wood St.,
Pittsburgh, Pa.

Elder, Thos. W.,
Estimater, Pressed Steel
Car Company,
44 Dawson St.,
Bellevue, Pa.

Elliott, A. H.,
Special Apprentice,
P. R. R. Co.,
Altoona, Pa.

Elliott, G. H.,
Buyer, Republic Iron
and Steel Co.,
Pittsburgh, Pa

Elliott, J. B.,
M. M., B. & O. R. R. Co.,
New Castle Junction, Pa.

Elmer, Wm., Jr.,
M. M., P. R. R. Co.,
28th Street,
Pittsburgh, Pa.

Engstrom, Franz,
Civil Engineer,
American Bridge Co.,
Ambridge, Pa.

Evans, R.,
Purchasing Agent,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Evans, R. J.,
General Manager,
Franklin Mfg. Co.,
Franklin, Pa.

Evans, Sam'l R.,
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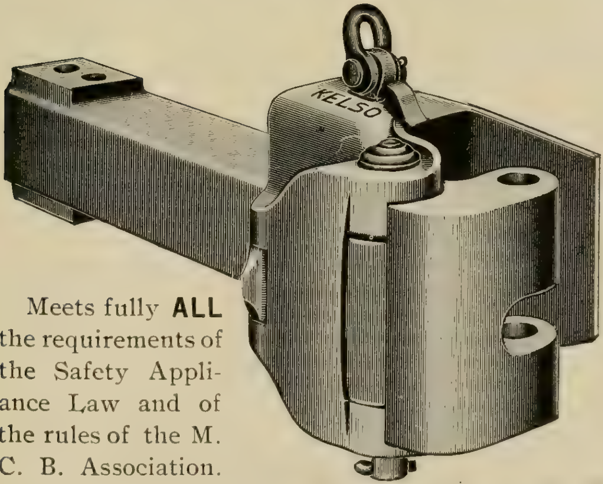

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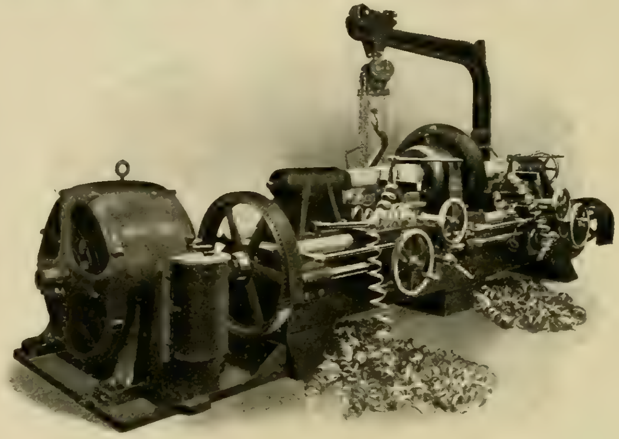

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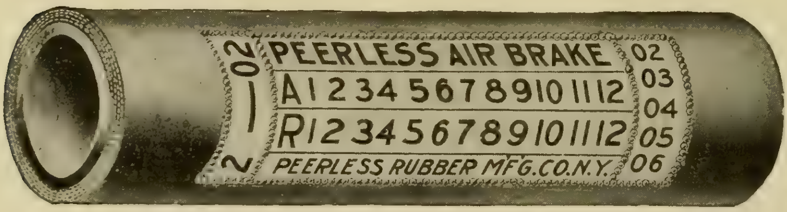
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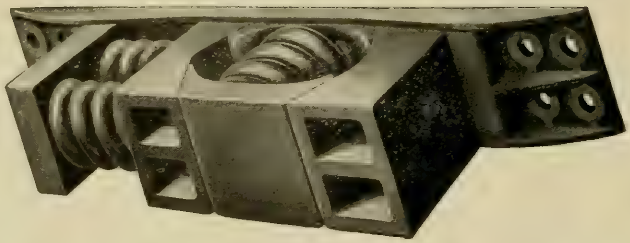

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